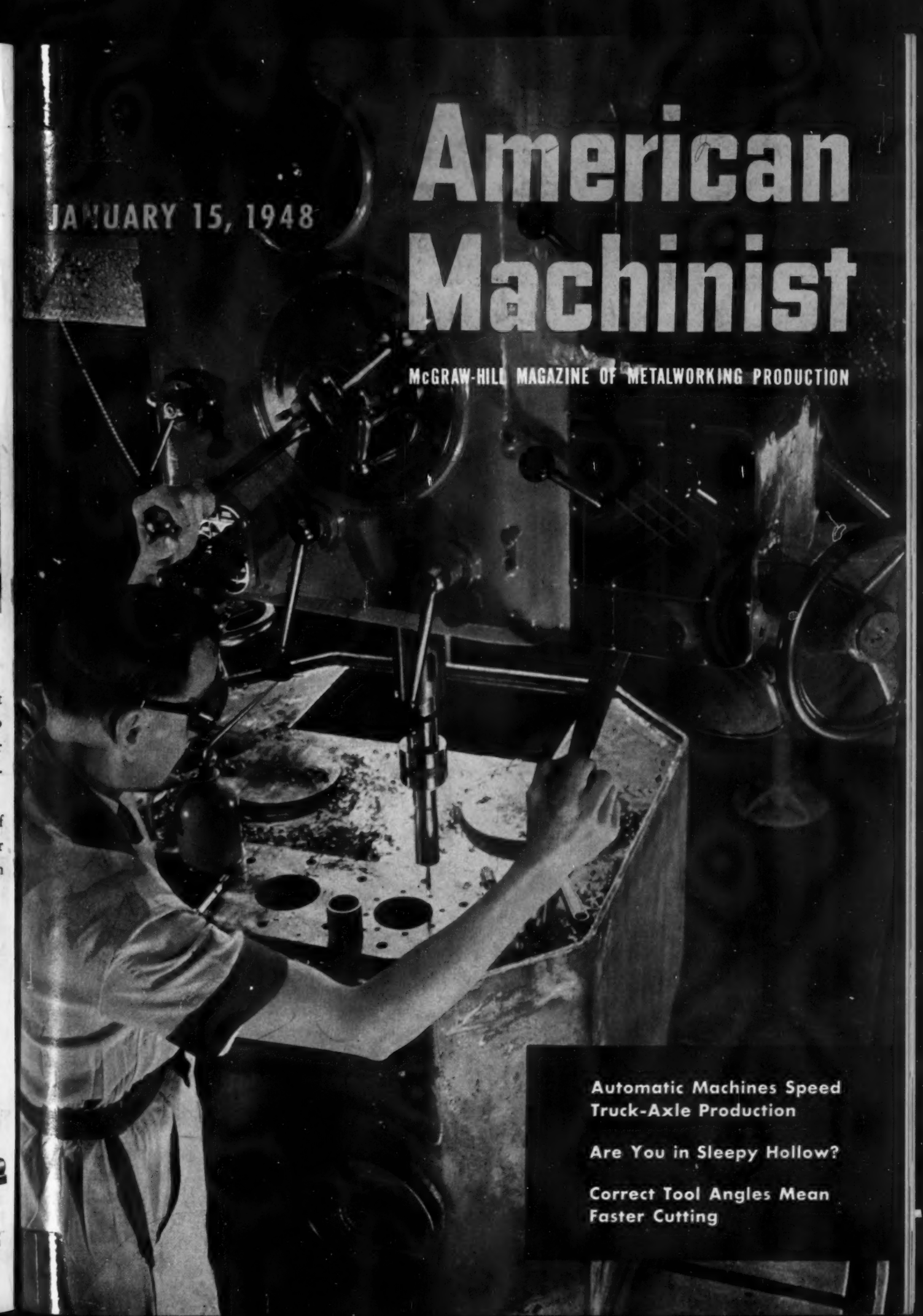


JANUARY 15, 1948

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Automatic Machines Speed Truck-Axle Production

Are You in Sleepy Hollow?

Correct Tool Angles Mean Faster Cutting

Not just an "improvement"... it's

ALL NEW!

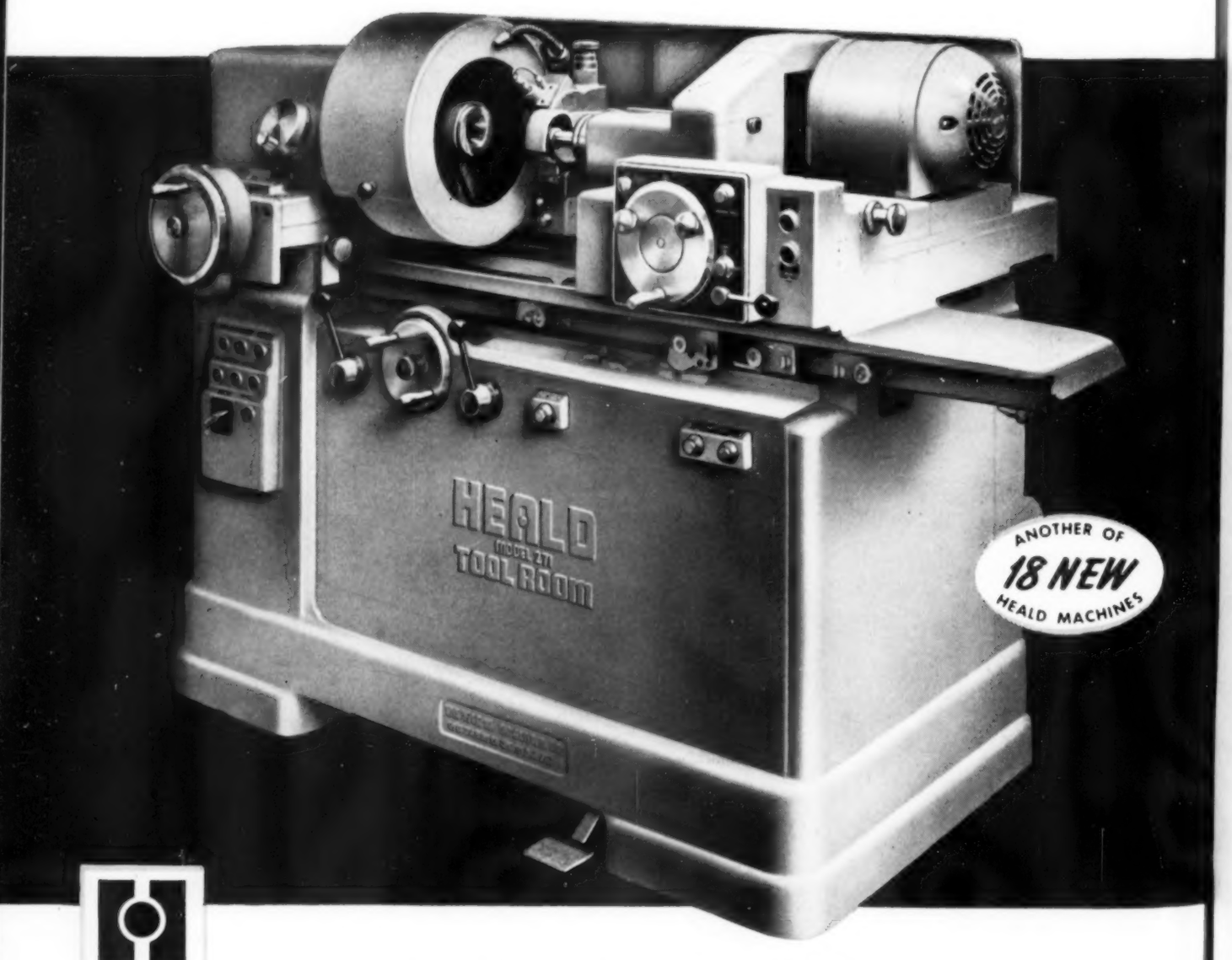
New features of this Heald Model 271 Tool Room Grinder help to increase accuracy and simplify operations

THIS IS A *completely new, completely different* type of internal grinder, specially designed to finish single parts or small-lot work. It's the Heald 271 Tool Room Model – handles a wide variety of work with exceptional accuracy.

The Model 271 features **fingertip adjustments** making setups easy and convenient. You set dogs, cross feeds and table speeds accurately and conveniently by means of micro-graduated scales.

Has generous capacity. **Workhead** swivels to wide angular positions for taper work. And an **extremely sensitive handwheel** provides full control of the table – with coarse feed for rapid travel, fine feed for precision facing.

Contact the Heald branch office nearest you for further information. Or write for the Model 271 bulletin which lists complete features and specifications.



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MAGAZINE OF METALWORKING PRODUCTION

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Clicks and Quips

The Cover . . . Vernon Gladdin, tapping a fabricated base for a governor oil pump at Woodward Governor Co., Rockford, Ill., provided a striking cover—and color—composition. The machine is an American radial drill, the Kodachrome is by M. Hans Zielke.

Van Winkle, Junior . . . Old Rip, whose story you learned at your mother's knee, has his counterparts today—the executives who have been asleep for 20 years or so. Your plant may be a dormitory for several. Some of the identification details are given in our lead article.

Tool Geometry . . . Maybe you saw, and maybe you didn't, the color model of tool angles in the Cincinnati Milling booth at the Machine Tool Show. It enables proper understanding of tool geometry—which can give increases in cutting efficiency equivalent to those attained by carbides. Or so says Dr. M. Kronenberg of the research dept. at Cincy Milling, who authored the explanation and gives pointers in this issue. If you use milling cutters, you'd better read—and profit.

More Zino . . . Tony Zino offers installment six on hydraulic oils, this one dealing with lubricating value. He points out that a heavier oil doesn't necessarily stop wear—low wear depends on correct viscosity and proper lubricating value. Your very favorable reaction to the series to date suggests the idea of a combined reprint—which we'll tell you about if we go ahead.

Hone As You Go . . . Engineers of E. W. Bliss have worked out a method of honing press bearings into alignment on the production line, saving scraping in assembly. They use Sunnen portable hones and call the new process "align honing." H. E. Linsley, associate editor, tells you how it's done herewith.

Transfer Tooling . . . Cross of Detroit has just completed an automatic line to produce truck axles, handling drilling, countersinking, tapping in a "Transfermatic" and adding special boring and facing machines. Chester Ricker provides details to supplement our "bare facts" description last issue . . . There's also a story on planning a large helix.

Homey Touch . . . All oil going to controls on the new Buick "Dynaflow" hydraulic transmission goes through one valve. Shop men, remembering F.D.R.'s famous remark at the last Democratic convention, "Clear it through Sidney (Hillman)," called it the "Sidney valve." At Buick, that's what it still is. Another part, of bulbous proportions, is called the "Mae West," and the planetary tailshaft which carries the planetary housing on one end is the "potato masher." Leave it to the boys in the plant to put in a bit of color.

Fan . . . Reports C. D. MacKinnon of Airdrie, Scotland: "We run an apprenticeship scheme on modern lines . . . *Machinist* figures prominently in it, particularly 'Practical Ideas,' 'Round Table,' 'Shop Shots,' etc., as excellent subject matter for discussion-group meetings. We regard the *Machinist* not as a publication in the ordinary sense, but rather as an institution."

Broaching . . . To continue the feast for tool engineers, we present part 2 of our series on fixtures for vertical surface broaching, the compact picture-and-caption handbook compiled by Ben Brosheer, our Chicago editor. This completes the 32 pages on today's tooling.

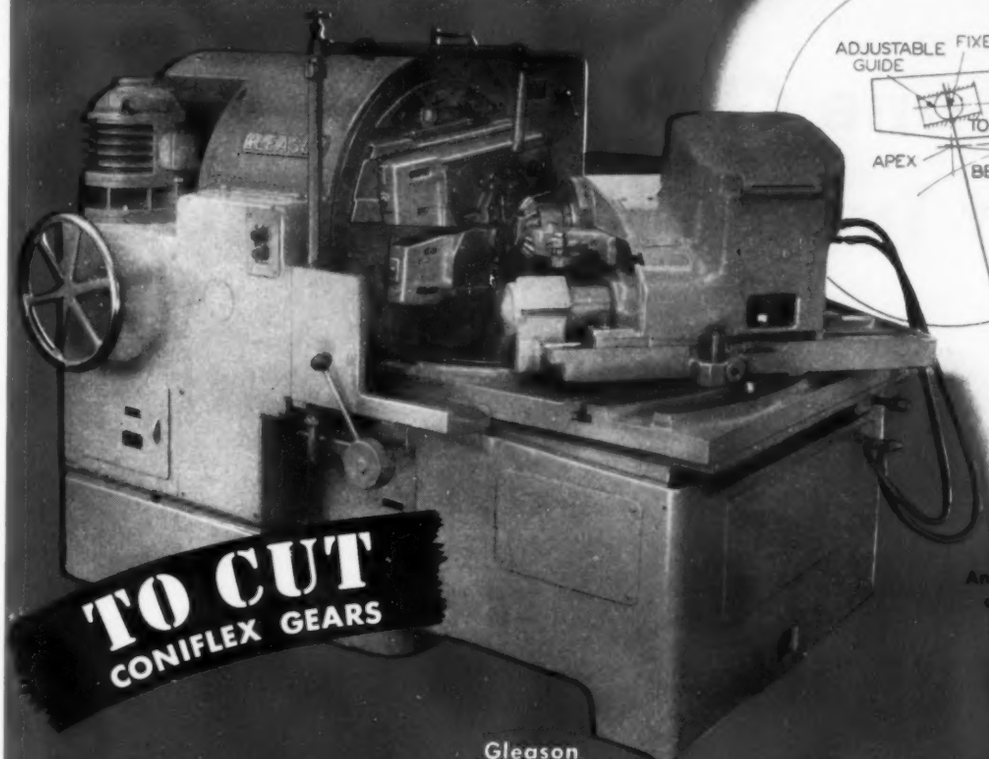
Coming . . . Jan. 29 *A.M.* will be your annual catalog of new metalworking equipment—and our 35th Annual Review Number. Advance reports indicate something like 1500 items on shop equipment, materials and supplies—the largest ever. We'll also provide our 16-page statistical report on the industry, plus usual news and reference book sheets. The total will be something like 180 pages, with a 4-color painting for the cover giving you a suggestion for using your copy to the fullest.

CUTTING RESEARCH MAN . . . Dr. Max Kronenberg, born in Berlin, has been associated with the Research Department of the Cincinnati Milling Machine Co. since 1936. He is the author of more than 120 papers on metal cutting, machine tools and related problems presented before various engineering societies, also the author of a book, *Grundzuege der Zerspanungslehre*, well-known in Europe. It deals with the derivation of fundamental formulae and data for metal cutting, based on a 7-year analysis of machinability investigations.

Prior to nearly 12 years of research work at Cincinnati Milling Machine, he spent 15 years of engineering work in Europe, including a period as consultant to the German machine-tool industry and an independent professorship at the Engineering College, University of Berlin. During the War, he was a consultant to the Secretary of War. Dr. Kronenberg is a registered professional engineer, and an active member of Sigma Xi.

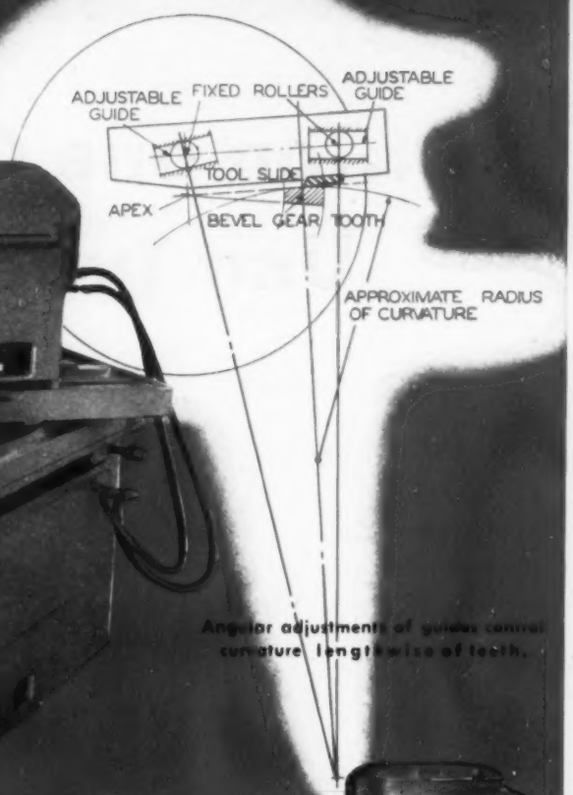
TO PRODUCE BETTER CONIFLEX* GEARS *The New, Easy Way...*

USE A COMPLETE UNIT OF GLEASON BEVEL GEAR EQUIPMENT



TO CUT CONIFLEX GEARS

Gleason
No. 14 Straight Bevel Generator



The new Gleason No. 14 Straight Bevel Generator, through simple angular adjustments of rollers and guides, (see sketch) automatically produces localized tooth bearing in Coniflex* gears in any desired amount.

* Coniflex—Straight bevels with localized tooth bearing. Reg. U. S. Pat. Off.

TO TEST CONIFLEX GEARS

Gleason
No 13 Universal Tester

TO SHARPEN CUTTING TOOLS

Gleason
No. 12 Generator
Tool Sharpener

GLEASON Works
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over Eighty Years

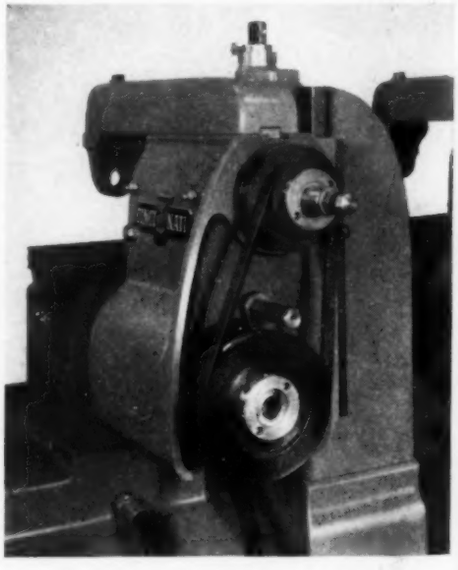
FOUR IDENTICAL OPERATIONS...

...on one CINCINNATI 000-4 Unit Type Milling Machine

● Take four small automatic milling machines, mount them on a common base, and you have many new and perhaps unexplored possibilities in low-cost production of small parts. Here's what you could do: Identical milling operations on each of the four heads... four different milling operations on the same part ... different milling operations on different parts... tool up one, two, three, or four heads, to suit the production schedule... with automatic loading fixtures, one man operates the entire battery of four units. ¶CINCINNATI 000-4 Automatic Unit Type Milling Machines transform all these fancies into fact. They incorporate four small automatic machines on a common base, with a common source of hydraulic power Yet speeds, feeds, and table cycles are entirely independent. They're fast, simple in construction, and easy to operate. The three small photographs reveal a few of the more important details. Further information may be obtained by writing for catalog M-1622.

◀ Close-up of one of the units on CINCINNATI 000-4 Unit Type Milling Machine. The large dial with pointer, at the left, indicates spindle speeds; 300 to 1800 rpm, infinitely variable. The other dial with pointer indicates table feeds; 1 to 40 in. per minute, infinitely variable.

▶ Rear of unit, showing two-step pulley and V-belt drive from hydraulic motor to spindle.



THE CINCINNATI MILLING

MILLING MACHINES

or FOUR DIFFERENT OPERATIONS

CINCINNATI No. 000-4 Unit Type Milling Machine.

Close-up of hydraulic pump and motor which powers all four units. Built-in push button panel directly above motor.

CINCINNATI

MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

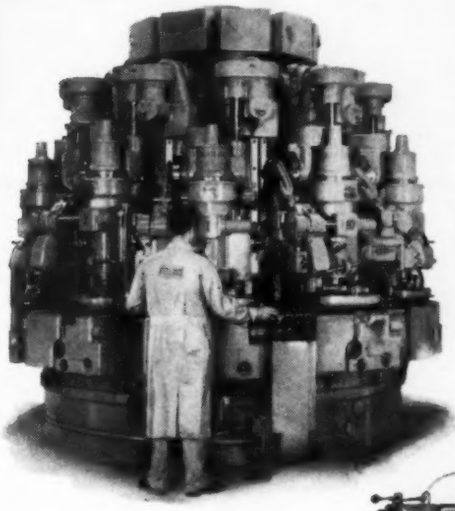
BROACHING MACHINES • CUTTER SHARPENING MACHINES

THE *Hush* THAT CAME DOWN FROM THE VERMONT HILLS

Quiet gear performance—the goal of production men—largely had its inception at the Fellows Gear Shaper plant in Springfield. For Fellows has brought to the world "gears that whisper" through a series of related machines and advanced techniques known as the "Fellows Method". The variety of gears that can be accurately produced by this method is astonishing, even to experienced engineers and production men, but the purpose of the "Fellows Method" is always the same: *more economical production of quiet, high-quality gears.*

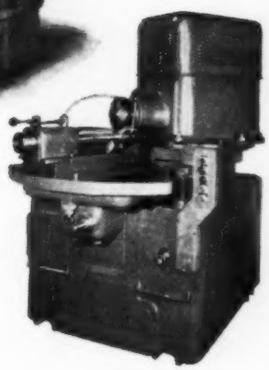
On Fellows equipment you can manufacture, at low cost, precision gears ranging in pitch from 2 to 200, and in diameter from 1/8 inch to 100 inches. You can economically cut, finish, measure, and test external and internal, spur, helical, herringbone and face gears;

GEAR SHAPERS · THREAD GENERATORS · CUTTERS · SHAVING AND BURNISHING MACHINES



The No. 10 Rotary Gear Shaper for the mass-production of external and internal spur and helical gears. No. 8 "Full-Tool" Gear Shaving Machine for faster finishing—to a high degree of precision with correspondingly smooth tooth surfaces.

segment, and interrupted tooth gears, as well as sprockets, worms, cams, and many other parts.



Write for the 64-page illustrated book of ideas and techniques, "The Fellows Method." The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont, Branch Offices: 616 Fisher Bldg., Detroit 2; 640 West Town Office Bldg., Chicago 12; 7706 Empire State Bldg., N. Y. 1.

Fellows

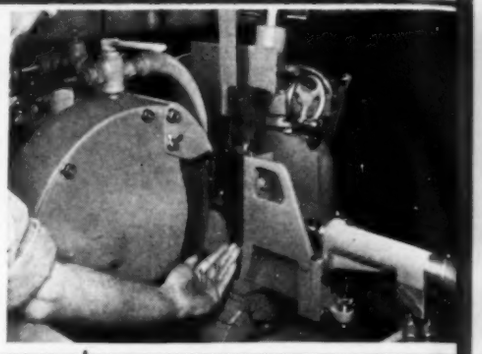
GEAR MEASURING AND INSPECTION INSTRUMENTS · PLASTICS MOLDING MACHINES

There's a size

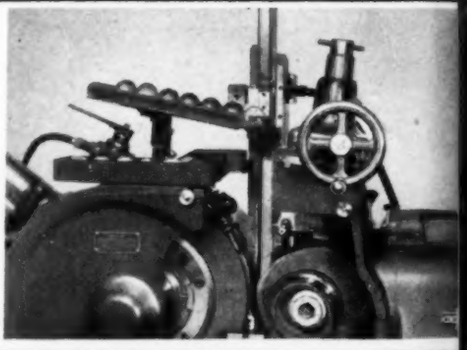
FILMATIC

CINCINNATI FILMATIC Centerless Grinding

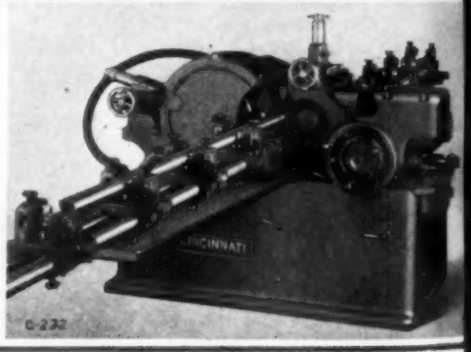
CINCINNATI FILMATIC No. 0 Centerless Grinding Machine, left. Catalog G-576. The No. 0 at the right has been tooled up with a magazine fixture to grind small drills, five of which are in the operator's hand.



Left: CINCINNATI DUAL FILMATIC No. 2 Centerless Grinding Machine. Catalog G-574. The most popular of all CINCINNATI Centerless Grinders, these machines are employed in grinding operations on various metal parts, wood, rubber, glass, plastic. The machine at the right has been tooled up to finish grind 20 sizes of pool and billiard balls, removing about .025" stock.



A CINCINNATI FILMATIC No. 3 Centerless Grinder is illustrated at the left. Catalog G-570. The illustration at the right shows one of these machines equipped with a Type D Long Bar Grinding Attachment for grinding steel bars from 1 to 4 in. diameter.



CINCINNATI GRINDERS

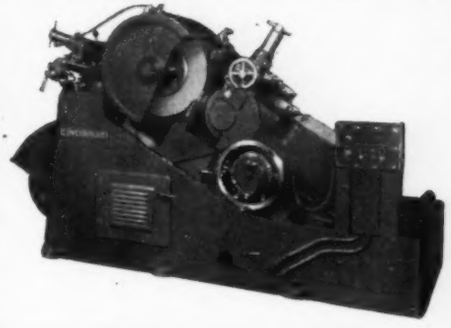
CENTER TYPE GRINDING MACHINES

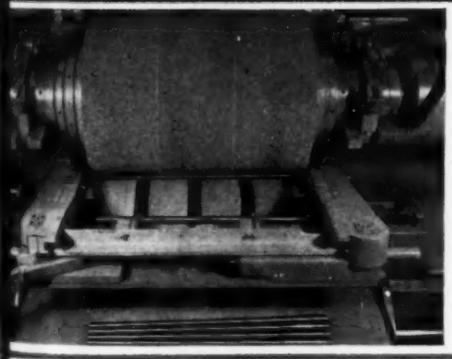
for your kind of work

Machines are built in six sizes - Nos. 0, 2, 3, 4, 5, 6

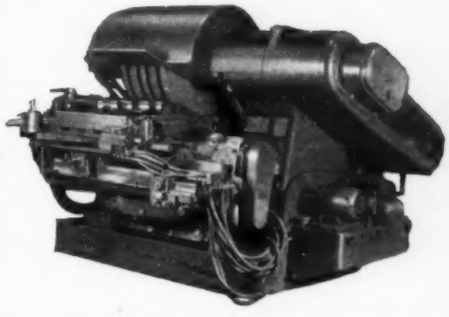
One user grinds surgical sutures, another grinds balance staffs for watches and clocks, and still another grinds steel bars—finished warehouse stock—on CINCINNATI FILMATIC Centerless Grinding Machines. Whatever your requirements may be, or the size of work, or the material from which it is made, Cincinnati can supply the correct centerless grinding machine. They are available in six sizes: Nos. 0, 2, 3, 4, 5 and 6. All of them have FILMATIC Grinding Wheel Spindle Bearings, an outstanding favorite with grinding men everywhere. And a wide selection of accessories and equipment is available for standard machines . . . FEEDMATIC Hoppers for automatic and continuous feeding; profile and radius wheel truing equipment; four types of bar grinding equipment, and many other fixtures. ¶The Cincinnati centerless method of rapid, precision grinding offers many cost-cutting advantages. Our Application Engineers will be glad to explain further. Meanwhile, write for the literature mentioned here.

Right: CINCINNATI FILMATIC No. 4 Centerless Grinding Machine. Catalog G-538. At the left, a No. 4 having increased capacity, is grinding the O. D. of 12 in. bearing races, square with the previously ground faces.





The machine at the right is a CINCINNATI FILMATIC No. 5 Centerless Grinder. Specifications on request. The No. 5 at the left, a 40 hp machine, is infeed grinding the complete length of 22 calibre rifle barrels.



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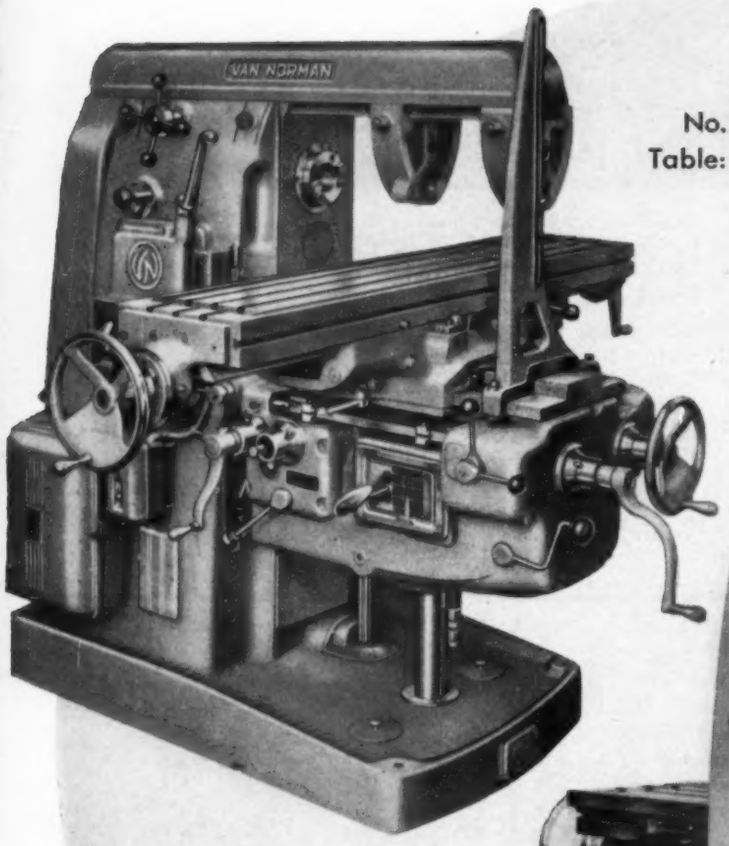
INCORPORATED

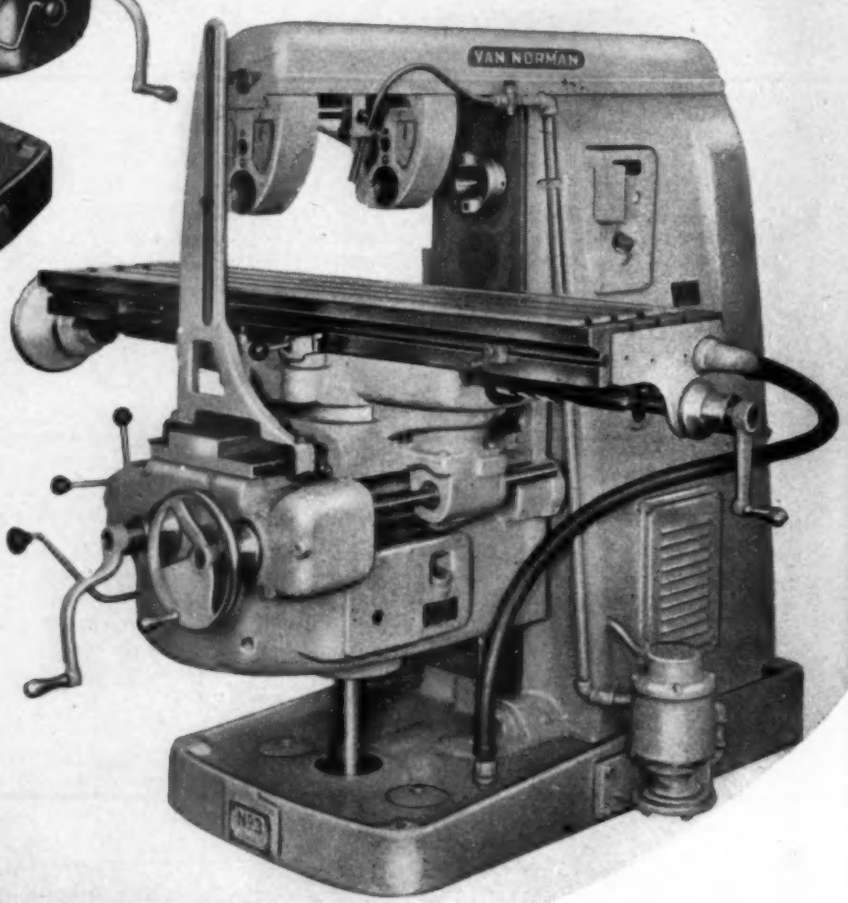
CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

For Improved Cutability



No. 2 Heavy
Table: 58 x 13 in.



No. 3 Standard
Table: 64 x 14 in.

"It pays to Van Normanize"

That Increases Production

IT'S

VAN NORMAN

Horizontal Milling Machines

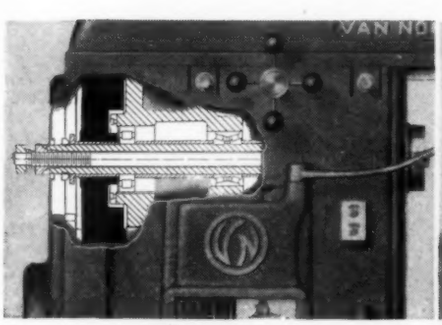
The new Van Norman Horizontal Milling Machines No. 2 Heavy and No. 3 Standard feature a heavy built-in spindle flywheel that provides smooth uninterrupted transmission of power to the cutter. This outstanding design advantage increases cutability and improves quality of finish of work produced on these machines.

The new heavy-duty spindle is supported by five anti-friction bearings assuring maximum spindle rigidity under the heaviest of cuts.

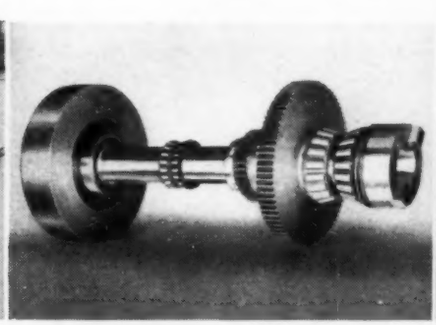
Other Van Norman advantages include . . .

Front and rear hand, power, and rapid traverse controls, single lever feed and speed selectors, overarm pilot wheel, large easy-to-read dials, automatic lubrication, hardened alloy steel gears with large tooth area and heavy rugged column and base.

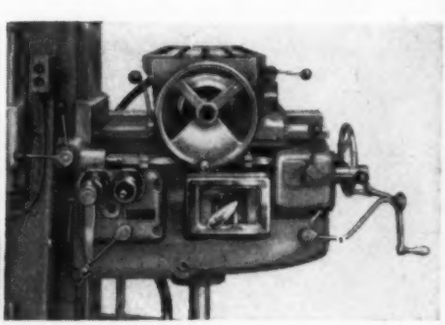
The Van Norman No. 2 Heavy and No. 3 Standard are available with plain or universal saddles. Write for information, today.



BUILT-IN SPINDLE FLYWHEEL, mounted on spindle inside the column, assures uniform uninterrupted transmission of power to cutter. The heavy flywheel increases and improves cutability . . . permits smoother finish of work surface.



5 ANTI-FRICTION BEARINGS support the large diameter alloy steel spindle. They maintain accuracy by assuring maximum spindle strength and rigidity under every type of cut.

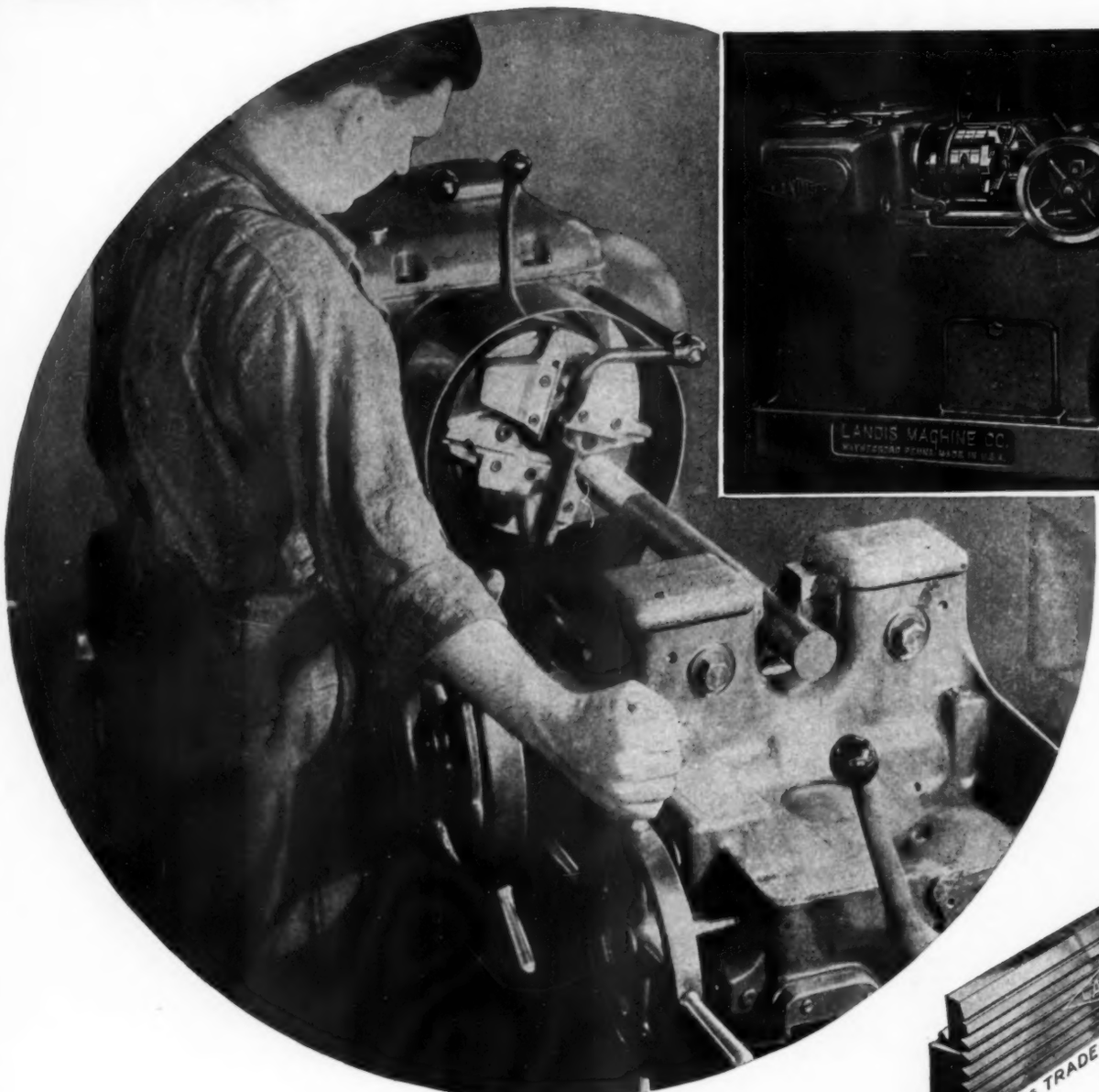


FRONT AND REAR CONTROL of fingertip power and six-way rapid traverse levers and manual adjustments simplifies operation. Directional power controls provide maximum work and operator safety.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

16 Vital Reasons LANDMACO

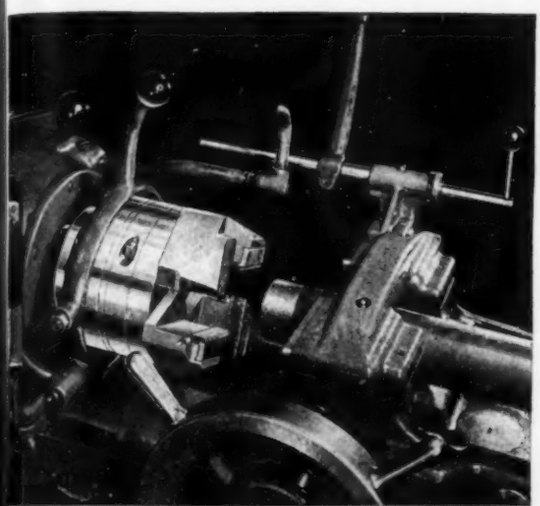


THE LANDIS CHASER

LANDIS
REG. U.S. TRADE-MARK PAT. OFF.

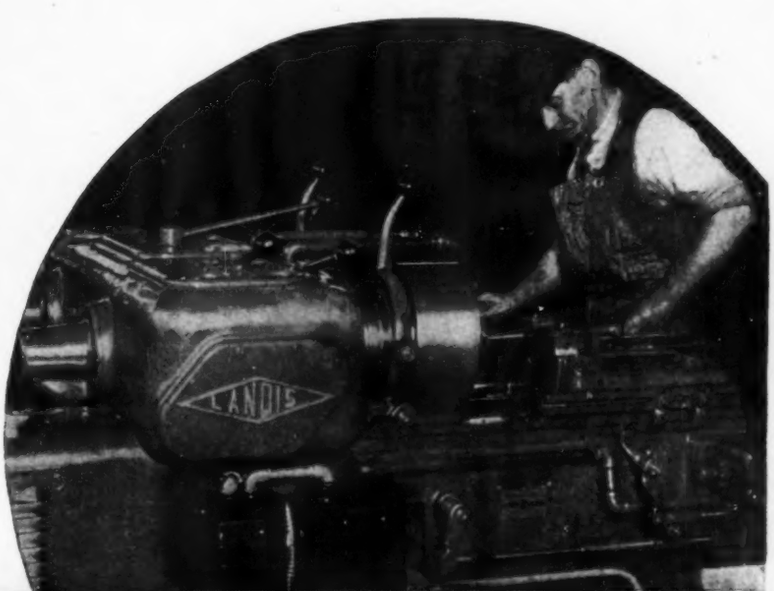
LANDIS

for the Superiority of THREADING MACHINES



The many new and exclusive features of LANDMACO Threading machines combine to assure the greatest possible degree of accuracy, ease of operation and flexibility in making set-up changes.

- Single Pulley Drive.
- Self-contained selective type gear box provides eight spindle speeds.
- Flood lubrication for all gears and bearings.
- Gear type pump driven and automatically reversible.
- Built-in pump can be removed without disconnecting any piping.
- Motor-in-base affords compact and efficient motor drive.
- Friction clutch control.
- Head opens and closes automatically.
- Hand lever for opening and closing head.
- Semi-steel bed of box type reinforced by inner walls.
- Minimum die head overhang.
- Adjustable vise easily lined up with spindle.
- Oil reservoir lubricates guides through felt pads in carriage base.
- Gibbed carriage compensates for wear.
- The heavy rim of vise hand-wheel, giving fly-wheel effect, facilitates gripping of work.
- Guards completely cover and protect guides.



MACHINE CO. WAYNESBORO PENNA. U.S.A.

SEMI-AUTOMATIC VALVE GRINDER

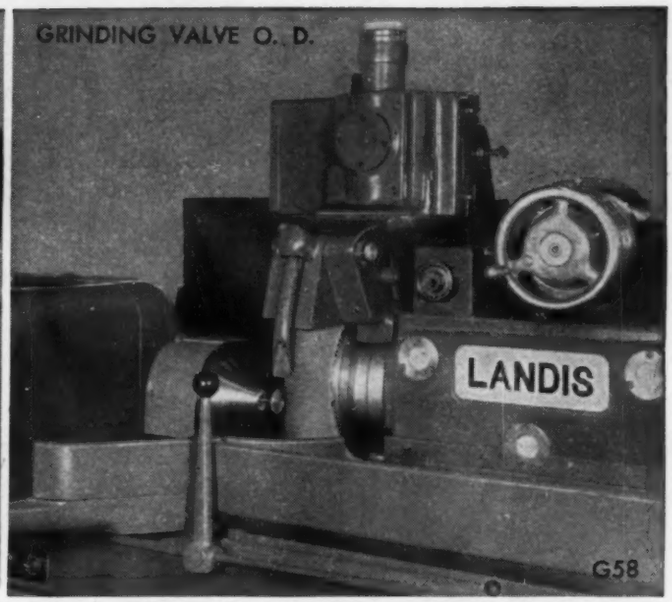
operator loads and unloads only

EQUIPPED WITH MICROSPHERE BEARINGS

H Type Valve Grinder/Bulletin CG47

LANDIS TOOL
Precision Grinders

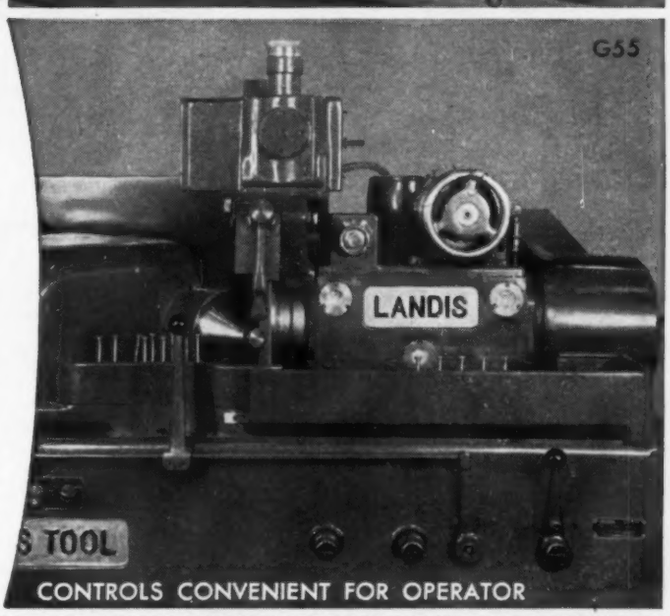
If you have a precision grinding problem, production estimates and tooling suggestions will be made on the basis of your blueprints.



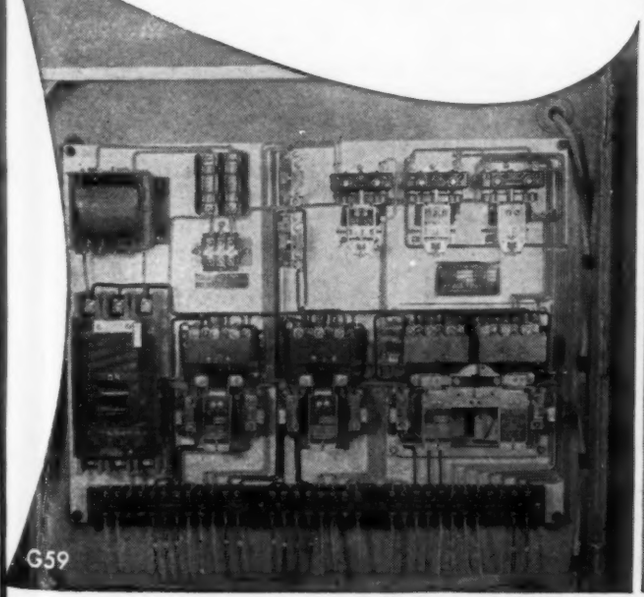
Semi-Automatic Operation

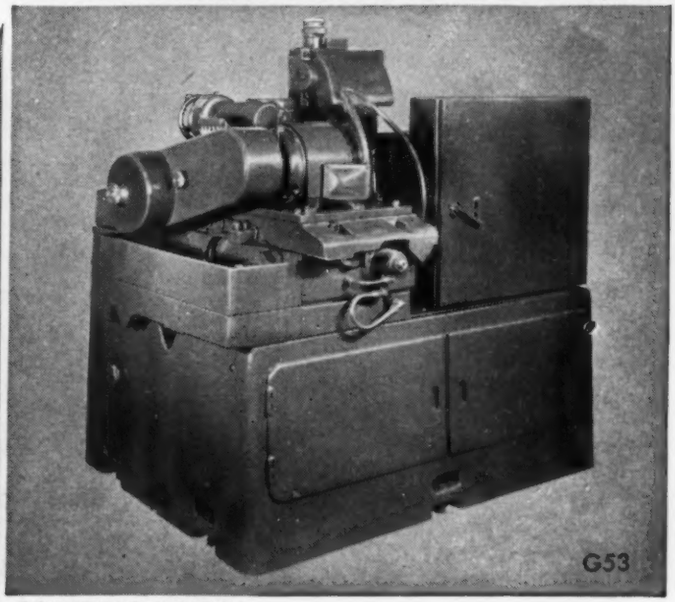
(continuous rotation of head)

1. Operator loads valve in chuck.
2. Operator starts grinding cycle.
   - (a) Hydraulic chuck closes.
   - (b) Rapid feed moves wheel to grind position.
   - (c) Slow grinding feed starts and continues to finish size against positive stop.
   - (d) Hydraulic timer starts—times length of spark-out.
   - (e) Wheel recedes automatically, grinding feed re-sets.
   - (f) Hydraulic chuck opens.
3. Operator unloads chuck.
4. Repeat.



CONTROLS CONVENIENT FOR OPERATOR

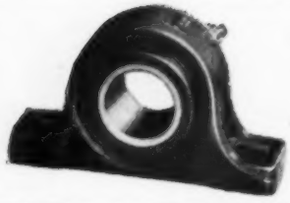




ELECTRIC MOTORS and CONTROLS BUILT-IN

LANDIS TOOL COMPANY WAYNESBORO, PENNA.

A full line of bearings calls for a full range of mountings—the Link-Belt line of ball and roller bearings offers just this—to meet all conditions of service efficiently. Some of the Link-Belt ball bearing mounted units are shown below:

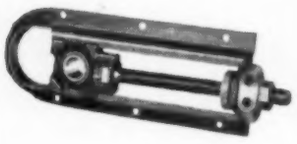


1 P-200 Pillow Blocks are compact, easy to mount and adjust. Open or closed end. Base affords space to drill for dowel pins.

2 H-200 Hanger Unit mounts two single row ball bearings in dumb-bell housing. Fits standard hanger frames.

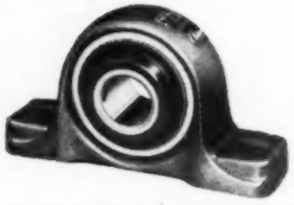
3 F-200 Flange Units. Open or closed end, with machined face, and space for dowelling to supporting structure. Can be used as step bearings on vertical shafts.

4 T-200 Ball Bearing Take-Up Unit permits varying shaft position to adjust belt, chain, etc. Furnished without frame guides or adjusting screw.



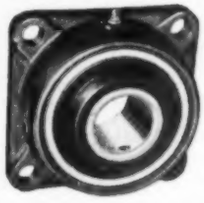
5 TAS-200 Light duty take-up. Pressed steel frames and cadmium plated adjusting screw.

6 TBS-200 Cast base take-up, with ball bearings correctly proportioned for each shaft size, occupy minimum space.



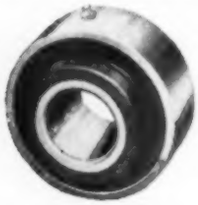
7 TDS-200 Take-up recommended where severe shock loads are expected. Center bar furnished on 24" movement and over.

8 P-300 (Fixed Type) and PE-300 (Floating Type) Pillow blocks. Compact, slotted bolt holes, space for drilling base for locating dowel pins.



9 F-300 (Fixed Type) and FE-300 (Floating Type) Flange Units, can be used as step bearings for vertical shafts.

10 FC-300 and FCE-300 Flange Cartridge Units provide simple mountings for use in cast or welded frames.



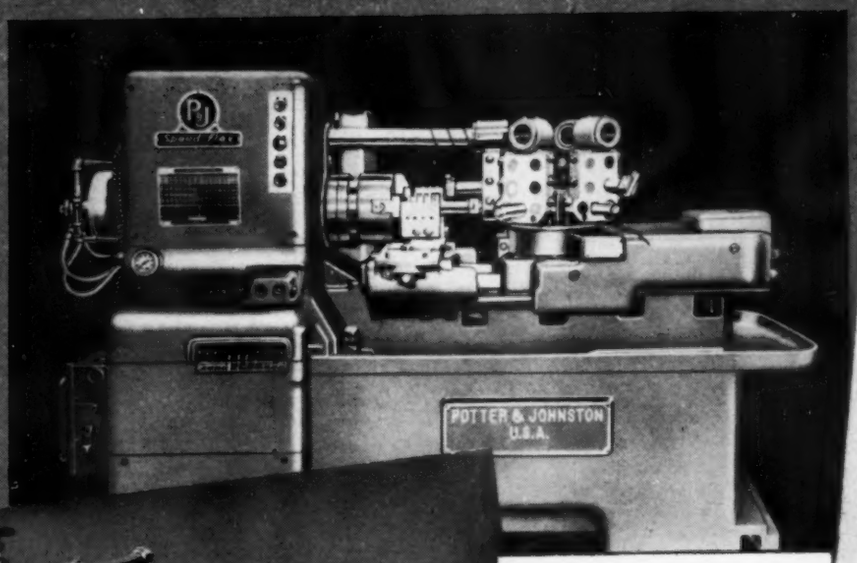
11 C-300 and CE-300 Cartridge Units are ideal for machine frames. Shaft may be removed from machine without disturbing bearing assembly.

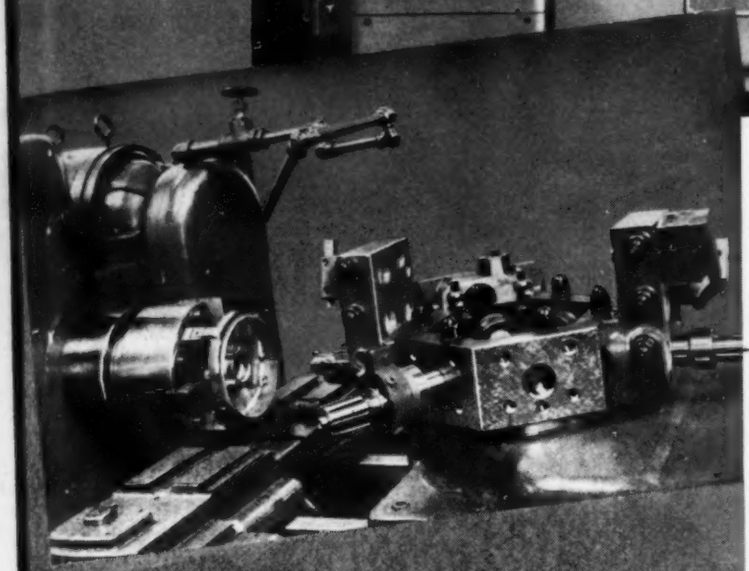
12 T-300 Ball Bearing Take-up Unit allows shaft movement to adjust belts, chains, etc.

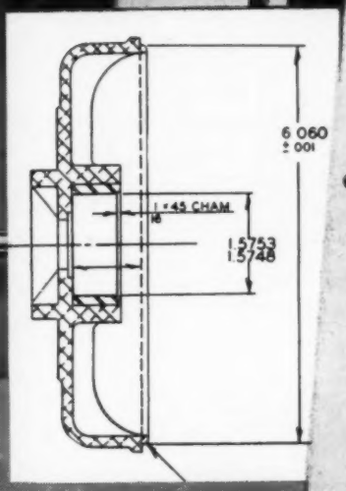
LINK-BELT

BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 2, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 10,856







DETAILS OF JOB

•

Part: Motor End Ball

Material: Die Cast Aluminum

Method and Operation: Presenting closed side to spindle, grip on chucking hub with three chuck jaws.

Machine as follows:
1st. T.F.: Bore hole in steel insert; face bottom; turn and face 6.060" dia.; face shoulder at rim.
2nd. T.F.: Finish face bottom; face shoulder (Slide Tool).
3rd. T.F.: Blank
4th. T.F.: Bore 1.574" dia.; turn 6.060" dia.
5th. T.F.: Blank
6th. T.F.: Ream 1.574" dia.

Floor-to-floor time: (average) 1.20 min. per piece.

•

Full details of the 3U Speed-Flex are available on request. Send blue prints or samples of parts for a time estimate by P&J Methods Engineers.

MOTOR END BELLS

machined at the rate of 42.5 per hour on the

NEW P&J 3U SPEED-FLEX *with special tooling . . .*

Production of small duplicate parts on the P&J 3U Speed-Flex, accurately and with low floor-to-floor time, is exemplified in the set up shown here. This machine, the latest and smallest P&J Automatic Turret Lathe, has already won wide acceptance for its versatility in tooling, convenience in operation and fast, dependable work. Aside from chucking of work and removal of finished parts, it is entirely automatic. A battery of these machines can be easily handled without fatigue by a single operator.

Outstanding features of the 3U Speed-Flex include four automatic changes of spindle speed and three automatic changes of feed all under electro-pneumatic control.

POTTER & JOHNSTON MACHINE CO., PAWTUCKET, R.I.

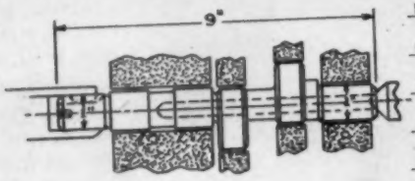
Pioneer Manufacturer of Automatic Turret Lathes

Low Cost Surface Finishing . . .

5-7 Micro Inches (RMS)! 100 Shafts per Hour!

Production Record Data — No. 1505

Norton Company, Grinding Machine Division, Worcester, Mass., U.S.A.



PART COMPRESSOR SHAFT

OPERATION SURFACE FINISH ALL BRGS (5)

MATERIAL MEEHANITE

PREVIOUS OP. GRIND

STOCK REM. .0001 to .0002"

LIMITS ± .0002"

FINISH 5-7 MICROINCHES (RMS)

PRODUCTION 100 SHAFTS / HOUR

MACHINE #12 SIMPLEX SURFACE FINISHER

FIXTURES 4 ARMS (#1 ARM TAKES 2 BRGS)

PREVIOUS PROD. — (NEW PART)

LAPPING ABRASIVE 320 GRIT TREATED ABRASIVE PAPER

OLD MACH.

LAPPING LUBRICANT NONE REQUIRED

REMARKS FINISH AND LIMITS CONSISTENTLY OBTAINED

NORTON GRINDERS and Lappers

Abrasives - Grinding Wheels - Grinding and Lapping Machines - Refractories - Porous Mediums - Non-slip Floors - Norbide Products - Labeling Machines

NORTO

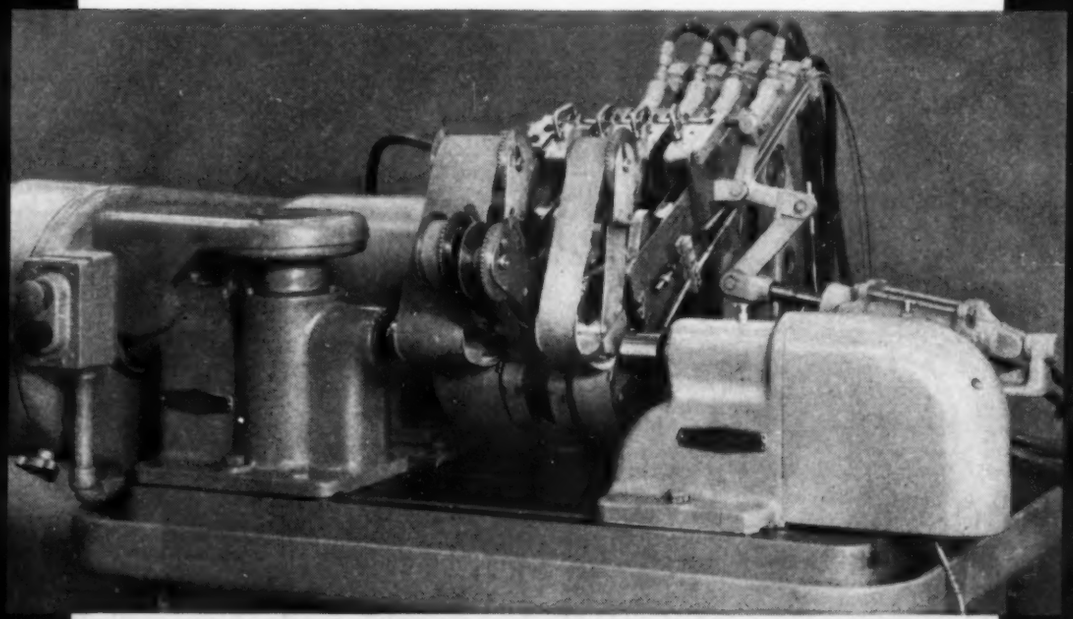
on the NORTON #12 SIMPLEX SURFACE FINISHING MACHINE

THE Norton #12 Simplex combines the highly desirable features of simplified, trouble-free design, and the ability to do an outstanding job. Here are some pertinent facts about this new NORTON machine:

- **Highly compact — very little floor space required.**
- **Handles work up to 12" in length.**
- **Pneumatically operated.**
- **A control valve automatically governs the loading and unloading cycle.**
- **Finishing cycle controlled by electric timer.**
- **Operation is by a single control lever, which the attendant merely turns.**
- **Uses a specially treated abrasive paper or cloth as the finishing medium.**
- **No coolant system required.**

Catalog #217-1 gives further details, write for a copy.

M-558



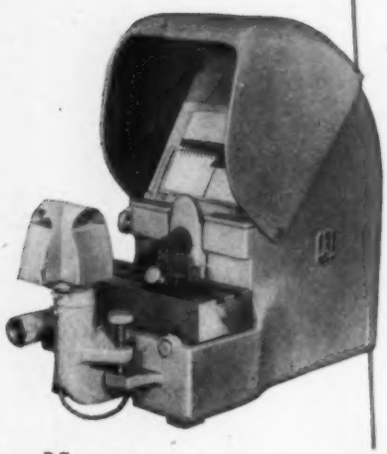
Closeup showing NORTON #12 Simplex Surface Finishing Machine with arms in operating position on a compressor shaft.

NORTON COMPANY, WORCESTER 6, MASS. · New York · Chicago · Detroit · Cleveland · Hartford · Distributors in All Principal Cities

The NEW Jones & Lamson BC-7 Bench Optical Comparator offers you a choice of three different table assembly combinations. This enables you to choose the model best suited to your needs, and obtain . . . *at lowest cost . . . the finest in Optical Comparators.*

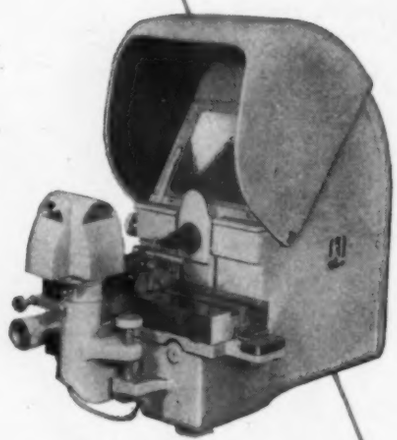
These models are the outcome of more than twenty-five years experience in the field of inspection by optical projection. They are designed to cover an almost unlimited range of inspection work — from precision products of the tool room through a diversity of industrial parts and products requiring a method of inspection that is at the same time accurate and rapid.

Our engineers are inspection specialists, their knowledge of holding fixtures, handling methods and suitable Comparator equipment, qualify them to study your inspection problems and make recommendations that will improve your profit picture. They have for others. Call, write or wire for their service today.



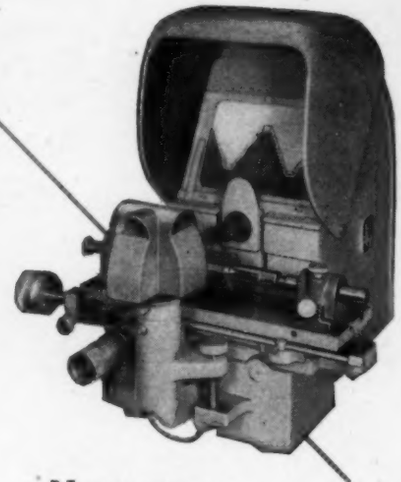
New MODEL BC-7A ★

This Model has a 12″ plain table. It is used for comparing the magnified shadow of an object with a master outline. Commonly used for inspecting such parts as knitting needles and sinkers on a production basis, it can handle objects up to 3″ diameter, at magnifications ranging from 5 to 125.



New MODEL BC-7B ★

This Model has a 14″ table that can be compounded for inspecting objects with helices. It is for rapid and accurate inspection, by comparison, of screw threads and other irregular shaped parts. Objects up to 3″ diameter and 11″ between centers can be inspected at magnifications from 5 to 125.



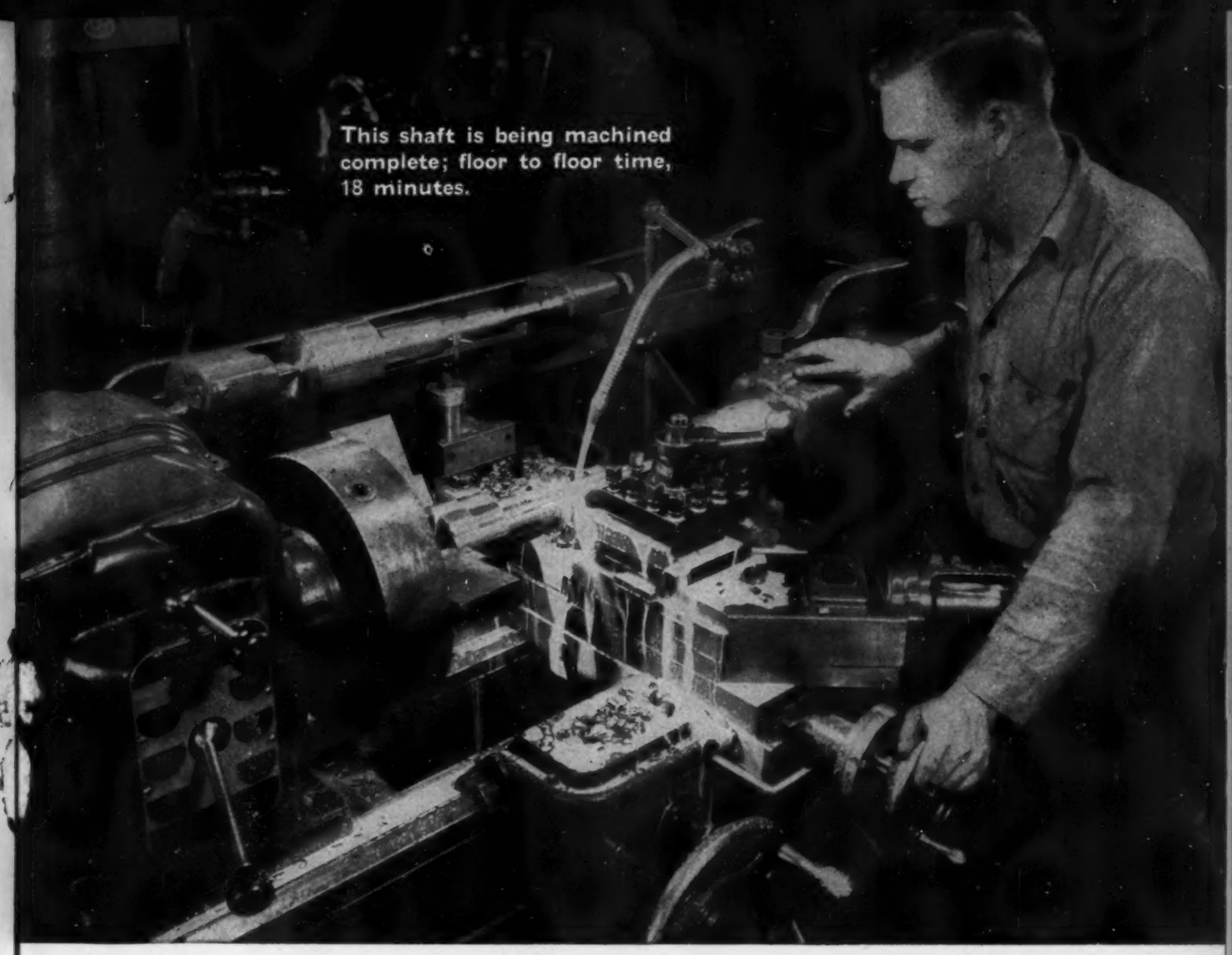
New MODEL BC-7C ★

Standard Bench Model with 16″ table equipped for making lateral measurements. The table can be compounded for projecting objects with helices. Objects up to 3″ diameter and 11″ between centers, can be inspected at magnifications ranging from 5 to 125. This Model is used to inspect a great variety of objects, such as hobs, taps, small tools, threaded parts, calculating machine parts, automatic telephone parts, instrument gages, dental instruments and thousands of others.

Jones & Lamson
OPTICAL COMPARATORS

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U. S. A.

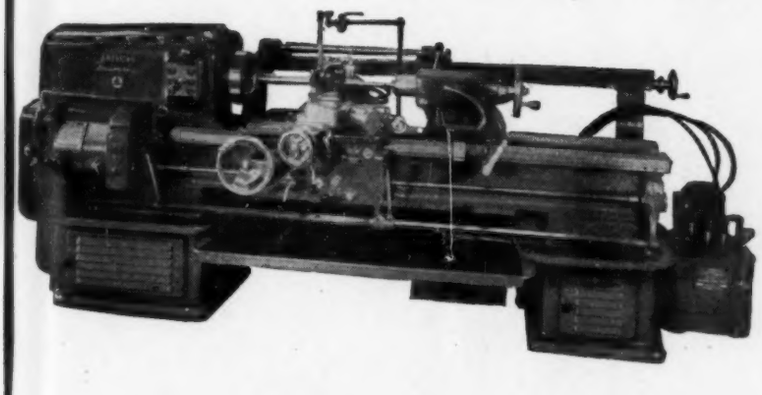
Manufacturer of: Universal Turret Lathes · Fay Automatic Lathes · Automatic Double-End Milling and Centering Machines · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers · Ground Thread Flat Rolling Dies



This shaft is being machined complete; floor to floor time, 18 minutes.

SHAFT PRODUCTION COSTS

CUT TO THE BONE...



The new "American" "H S-D" (Hydraulic Shaft-Duplicating) Lathe presents to the metal-working industry a new and revolutionary technique for the production of various types of shafts. Other methods are now outmoded by this new development. Production costs have hit a new low. Piston rods that formerly took over 4 hours are now produced on this lathe in 36 minutes.

• **Write for descriptive literature—Bulletin No. 35**

THE AMERICAN TOOL WORKS CO.

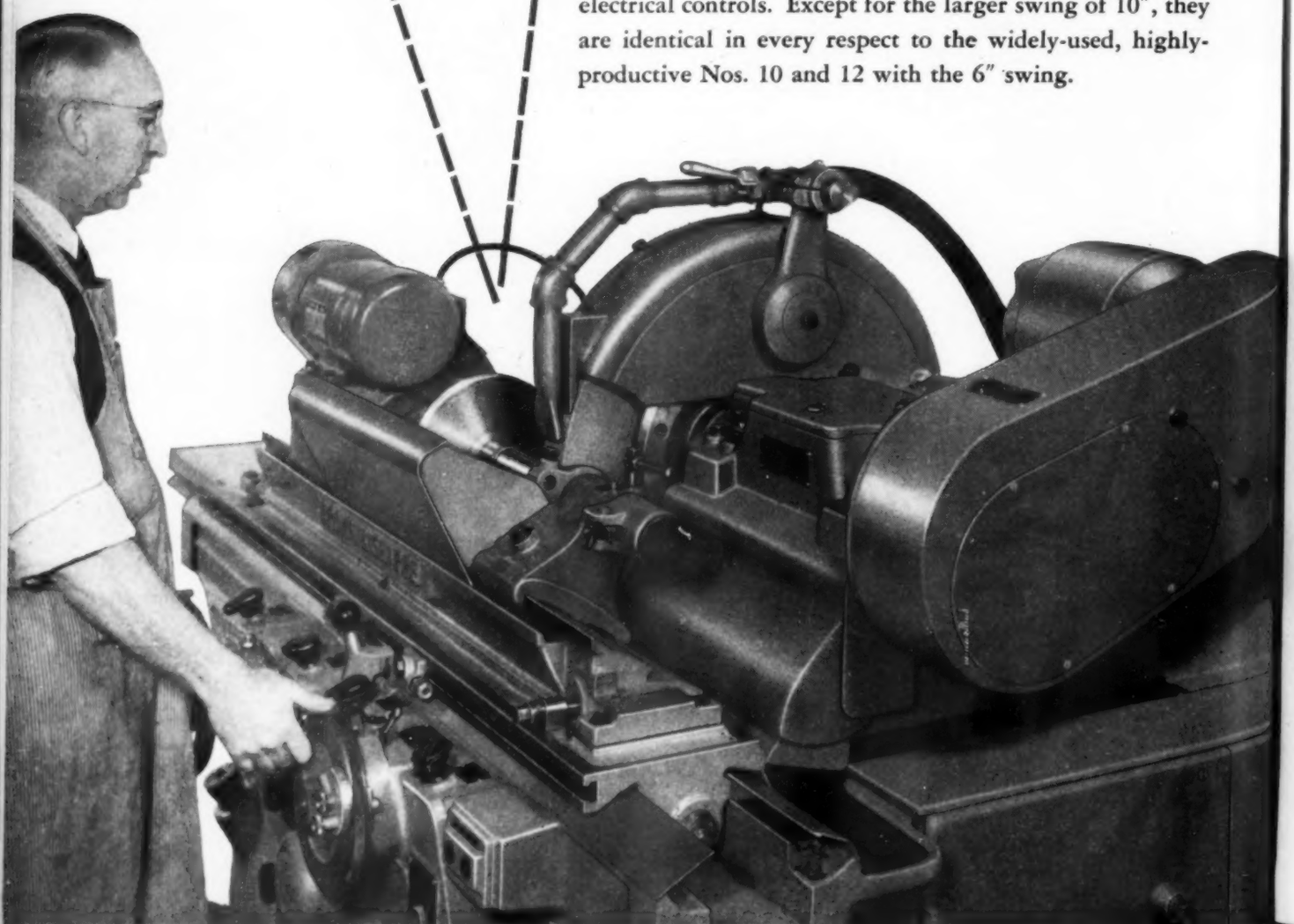
Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

NEW! a 10" swing for Nos. 10 and 12

PROVIDES AMPLE CLEARANCE FOR LARGER DIAMETERS AND PROJECTIONS

THE NEW, 10" swing machines, like those with the 6" swing, are designed particularly for the rapid cylindrical grinding of small and medium-sized parts to close limits on a production basis. They can grind many parts to limits of .0001" tolerance with consistent uniformity on ground diameters up to 3". These machines are compact and self-contained and are operated by very simple hydraulic and electrical controls. Except for the larger swing of 10", they are identical in every respect to the widely-used, highly-productive Nos. 10 and 12 with the 6" swing.



BROWN &

Plain Grinding Machines

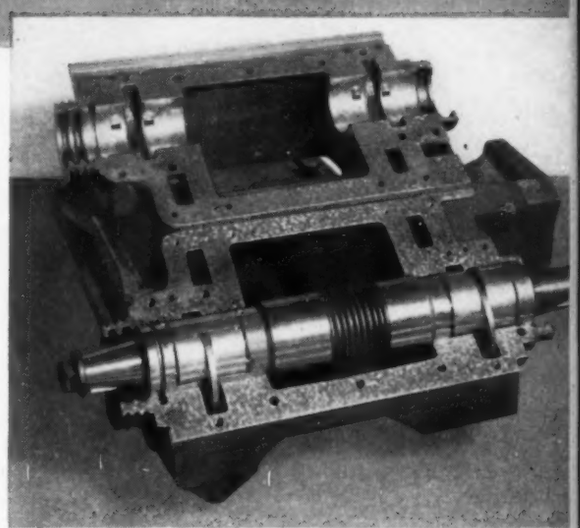
HIGHLY-PRODUCTIVE FEATURES OF TIME-TESTED NOS. 10 AND 12 MACHINES

ONCE THESE machines have been set for a given production job, they can be operated entirely by only two controls . . . the cross feed handwheel and the table start-stop knob.

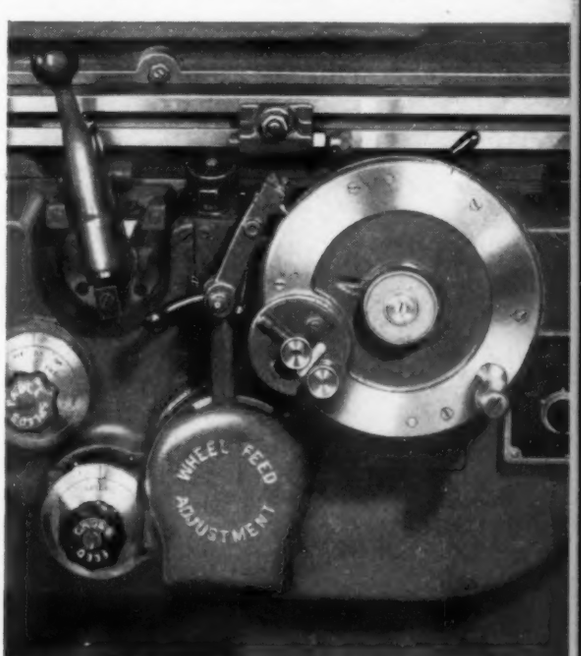
Their unique spindle design assures rapid, trouble-free precision grinding. Spark-out time is at a minimum due to unusually small clearance between spindle and its boxes—practically eliminating radial spindle play. The spindle is ground to extremely close limits of concentricity, straightness and finish and is lubricated with extra-light spindle oil.

Correct adjustment of spindle boxes is quickly and positively obtained with the spindle running . . . a very simple job.

Other up-to-the-minute advantages include time-saving knob controls, individual motor drives, cross feed mechanism with adjustment to .0001" on diameter and automatic oiling. They all add up to surer, easier operation that means faster, better production. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



Wheel slide showing precision spindle assembly.



Cross feed handwheel—controls advance and withdra of grinding wheel and start-stop of headstock and cool

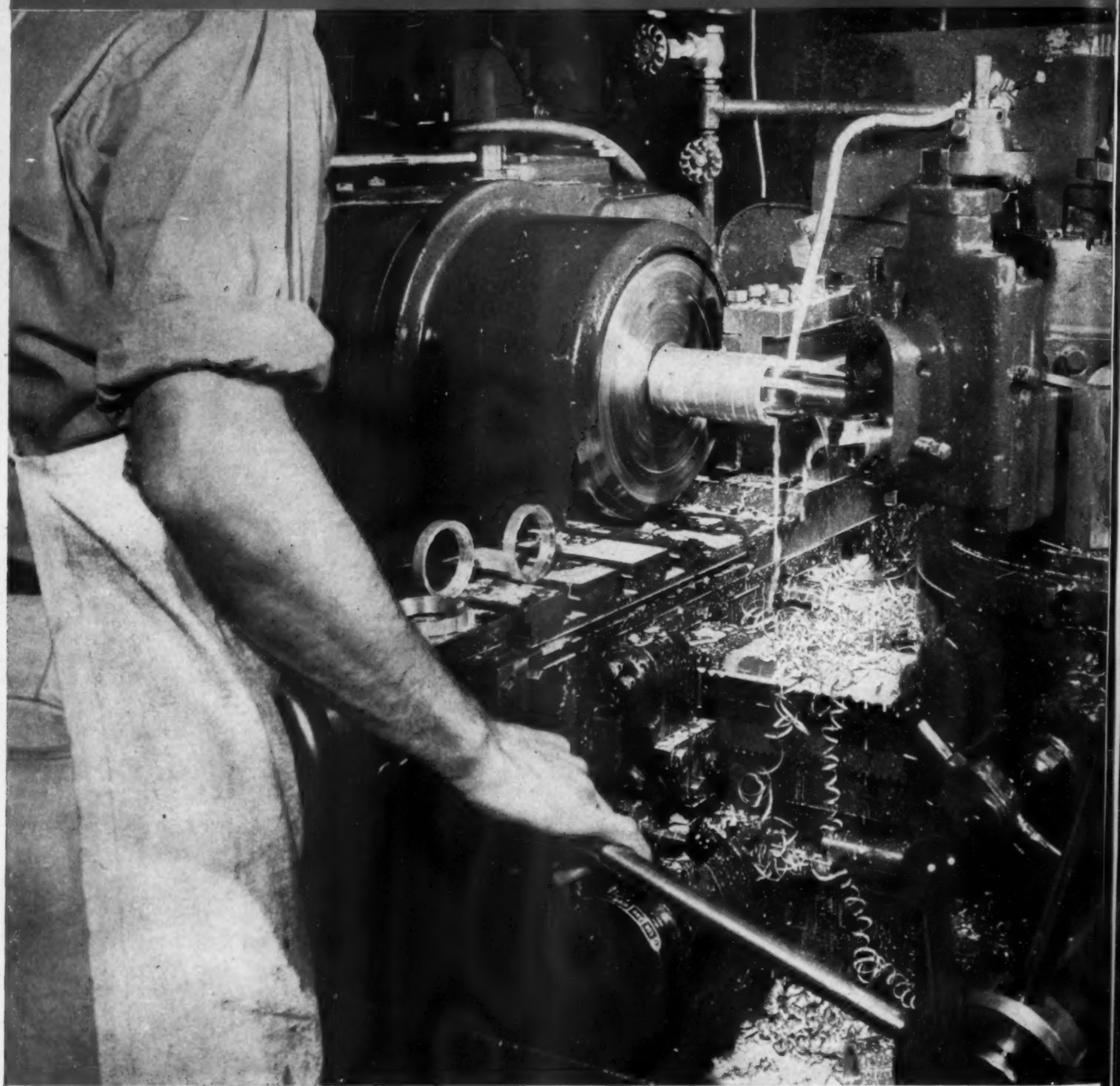
CAPACITIES

6" Machines, No. 10 (6" x 18"), No. 12 (6" x 30"). Centers sw 6 1/16" diameter over table. Distance center line of work to center wheel spindle, greatest, 14 1/8", least 7 5/8".

10" Machines, No. 10 (10" x 18"), No. 12 (10" x 30"). Sa grinding capacities as 6" except centers swing 10 7/8".

SHARPE B·S

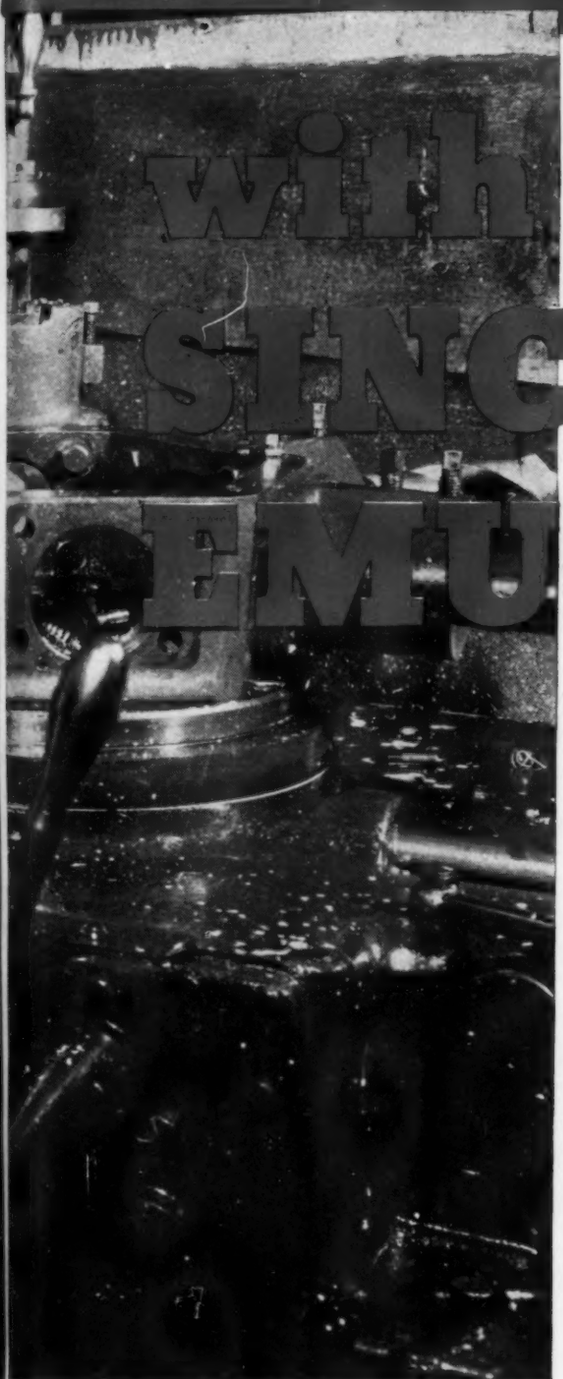
"HARD" WATER..



Where "hard" water is encountered, the usual type of soluble cutting oils cannot be successfully used without special water treatment prior to mixing the emulsion.

EMULSICOOL solves that problem. This new, specially developed Sinclair soluble cutting oil mixes readily to a stable emulsion even under the most severe "hard" water conditions.

..NO PROBLEM



SINCLAIR EMULSICOOL produces an emulsion that does not foam or separate... does not cause rusting of the machine tool or its working parts... is harmless to the finished product. EMULSICOOL is processed to make special treatment of water unnecessary. It is an efficient soluble oil for cutting or grinding operations on any kind of metal. We'll gladly advise you about its application to your problems.

*Reg. U.S. Pat. Off.

SINCLAIR
INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE
SINCLAIR REFINING COMPANY, 630 FIFTH AVE., NEW YORK 20, N. Y.

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:

Getting Authentic Information

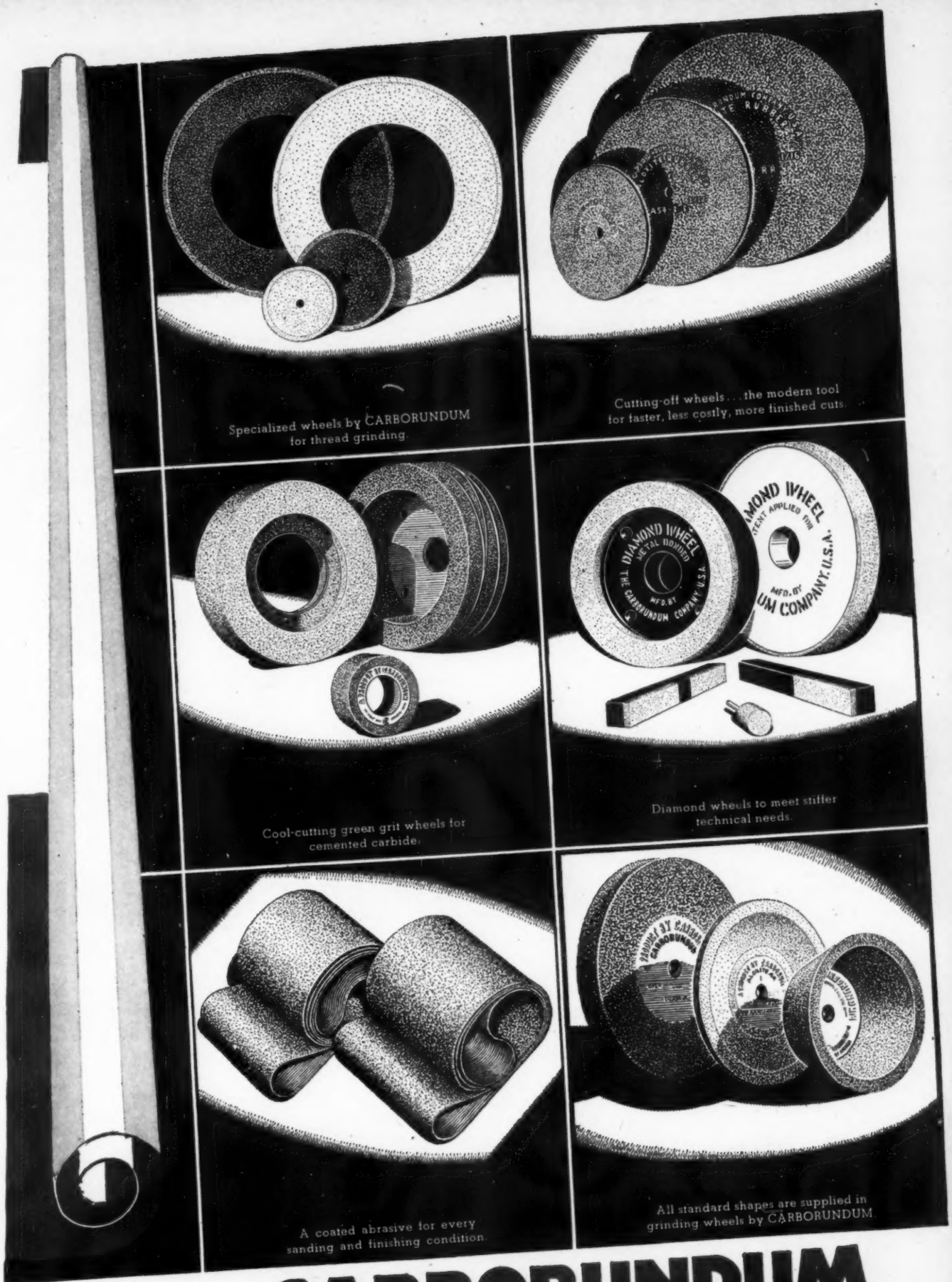
ANSWER BY

CARBORUNDUM
TRADE MARK

Being so closely identified with the development and progress of abrasives, it is natural that The Carborundum Company should be the source of so much authoritative literature on their application, care, and handling. Certain highly successful concerns regard the helpful service of technical and engineering literature supplied by The Carborundum Company as a significant point in their preference for abrasives by CARBORUNDUM. Ask your Carborundum representative for literature and bulletins related to your own grinding and finishing operations. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM

A Good Rule for Good Grinding

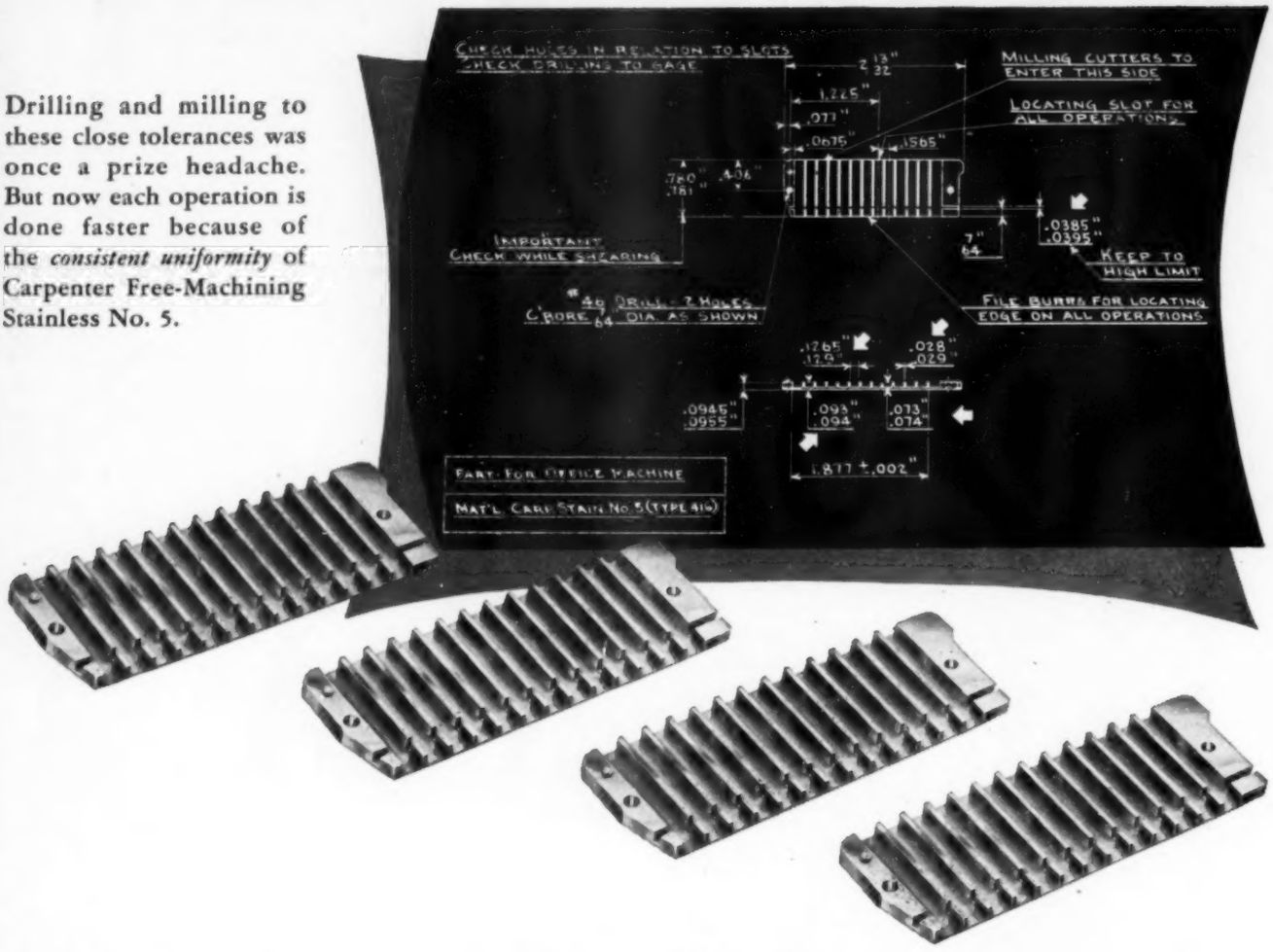

Specialized wheels by CARBORUNDUM for thread grinding.
Cutting-off wheels . . . the modern tool for faster, less costly, more finished cuts.
Cool-cutting green grit wheels for cemented carbide.
Diamond wheels to meet stiffer technical needs.
A coated abrasive for every sanding and finishing condition.
All standard shapes are supplied in grinding wheels by CARBORUNDUM.

. . . CALL IN **CARBORUNDUM**

REG. U.S. PAT. OFF. TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

Drilling and milling to these close tolerances was once a prize headache. But now each operation is done faster because of the *consistent uniformity* of Carpenter Free-Machining Stainless No. 5.


CHECK HOLES IN RELATION TO SLOTS
CHECK DRILLING TO GAGE
MILLING CUTTERS TO ENTER THIS SIDE
LOCATING SLOT FOR ALL OPERATIONS
IMPORTANT
CHECK WHILE SHEARING
KEEP TO HIGH LIMIT
FILE BURRS FOR LOCATING EDGE ON ALL OPERATIONS
PART FOR OFFICE MACHINE
MAT'L CARP. STAIN. NO. 5 (TYPE 416)

You Can Turn It Out *for less*

with Carpenter Free-Machining Stainless

The point on this carburetor needle is made to close tolerances and the needles are produced economically, thanks to the easy machining properties of Carpenter Stainless No. 5. The special cold drawn shape as supplied from the mill also reduced the total amount of machining needed on the job.

On this job the manufacturer got more than the corrosion resistance and strength of Stainless when his orders specified Carpenter Free-Machining Stainless No. 8. Its uniform machinability from lot to lot saved fabricating dollars every day.

more than corrosion resistance

available for prompt shipment from stock

• Easier Stainless Fabrication
• Lower Unit Costs

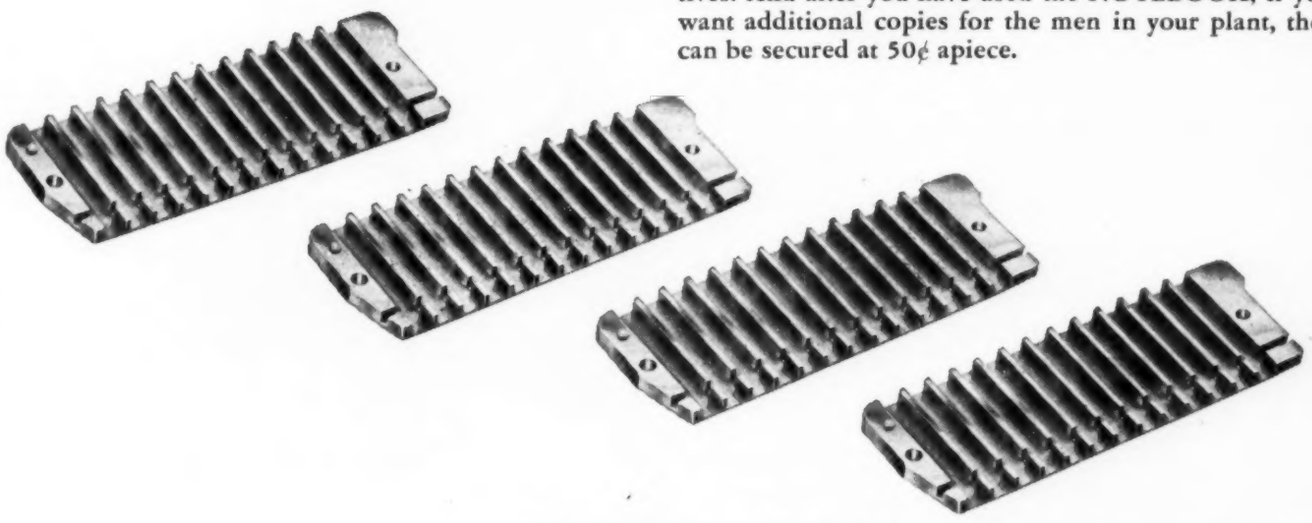
Here is a way to keep your Stainless machining costs in line, even when jobs are intricate and tolerances close.

Helping you to machine parts from Carpenter Stainless at less cost is as much a part of our work as the making of uniform, easy-cutting Stainless Steels. So whenever you run up against a problem of selecting and working with the Stainless that will do your job best, make full use of our experience. Your nearby Carpenter representative can give you personal help in the shop and supply you with printed information to help you shave costs on each Stainless machining operation. For example . . .

Here's Complete Information To Help You Machine Stainless Steel At Less Cost . . .

This NOTEBOOK contains useful information, much of it never before published. It will give you hints to take the kinks out of Stainless machining jobs, reduce rejects and cut costs. In each chapter you'll find a complete Check Chart that lists common "trouble spots", and gives shop tips on how to cure them.

Your nearby Carpenter representative will be glad to give a personal copy of the "NOTEBOOK on Machining Stainless Steels" to Production and Management Executives. And after you have used the NOTEBOOK, if you want additional copies for the men in your plant, they can be secured at 50¢ apiece.



THE CARPENTER STEEL COMPANY, 109 W. Bern St., Reading, Pa.

Carpenter

FREE-MACHINING

STAINLESS STEELS

call your local Carpenter Warehouse

Branches: Boston • Bridgeport, Conn. • Buffalo • Chicago • Cincinnati • Cleveland Dayton • Detroit • Hartford • Indianapolis • Los Angeles • New York • Philadelphia Providence • St. Louis • Worcester, Mass.

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INDUSTRY FAVORS MORE CONTROLS!

. . . like 4-way GEROTOR AIR VALVES

GEROTOR 4-Way Air Valves are welcomed throughout industry for their easy, positive control of double-acting cylinders. Designed to provide a continuous, uniform air flow at pressures up to 150 p.s.i., GEROTOR Air Valves are dependable, durable and compact.

Available in five sizes (¼"—⅜"—½"—¾"—1") for hand, foot, solenoid, cam and pilot operation. Write for Catalog Section 300 . . . today!

GEROTOR

air valves & cylinders - hydraulic pumps, motors, valves & cylinders

GEROTOR MAY CORPORATION • BALTIMORE 3, MD.

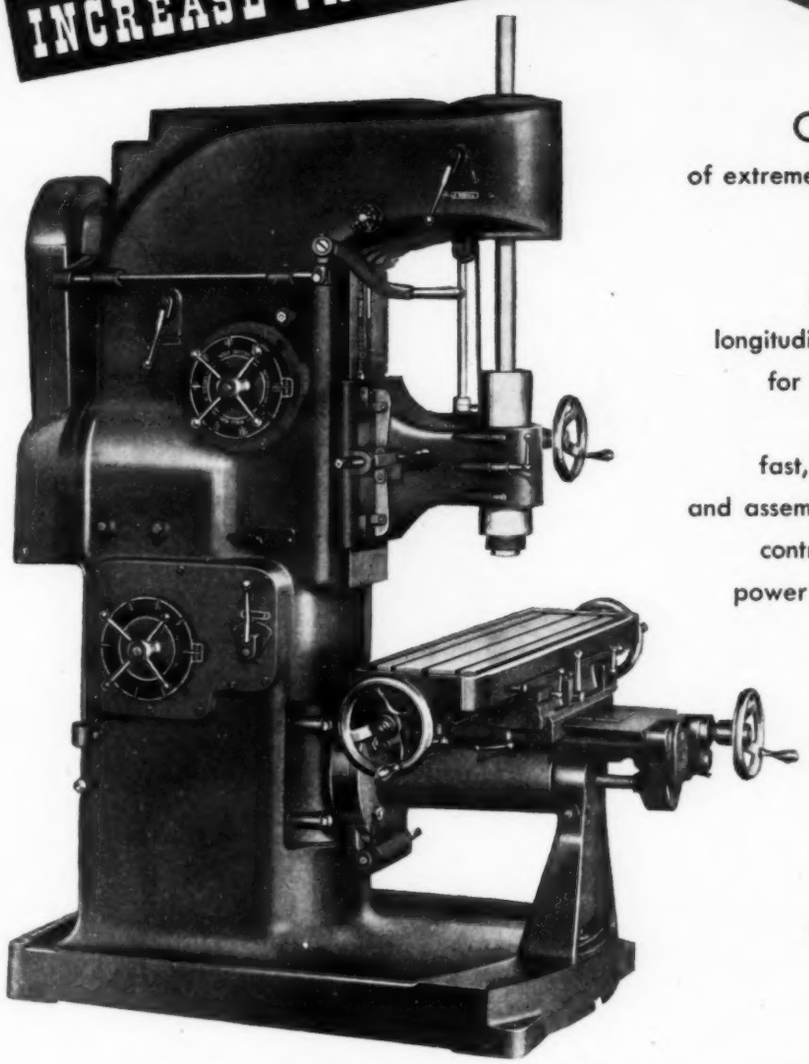
Eliminate Extra Setup Time

REDUCE UNIT COSTS

Save Unnecessary Work Transfers

INCREASE PRODUCTIVE TIME

No. 50 PRECISION BORING AND VERTICAL MILLING MACHINE



Combined in a single solid-base machine of extreme capacity — every feature for precision boring and accurate milling!

In the No. 50 are exceptional cross and longitudinal table travel plus long spindle travel for handling an extensive range of work — rugged, rigid bed-type construction for fast, heavy cutting — precision manufactured and assembled for positive accuracy — convenient controls for easy, effortless operation — and power to spare for the heaviest, toughest jobs.

With far greater range than other machines of comparable size, the No. 50 is an assured investment in reduced costs and more profitable production.

Send For Complete Catalog Details

Sixteen Spindle speeds, 40 to 2000 r.p.m. ● 9 Spindle feeds, .005″ to .010″ ● 100″ table traverse per minute in both directions ● 16 Table feeds, 5/16″ to 20″ per minute ● 7½ h.p. Drive

W. B. KNIGHT

MACHINERY COMPANY

KNIGHT VERSATILE MILLERS ACCURATE-RIGID

MORE GOODS for MORE PEOPLE at LOWER COST

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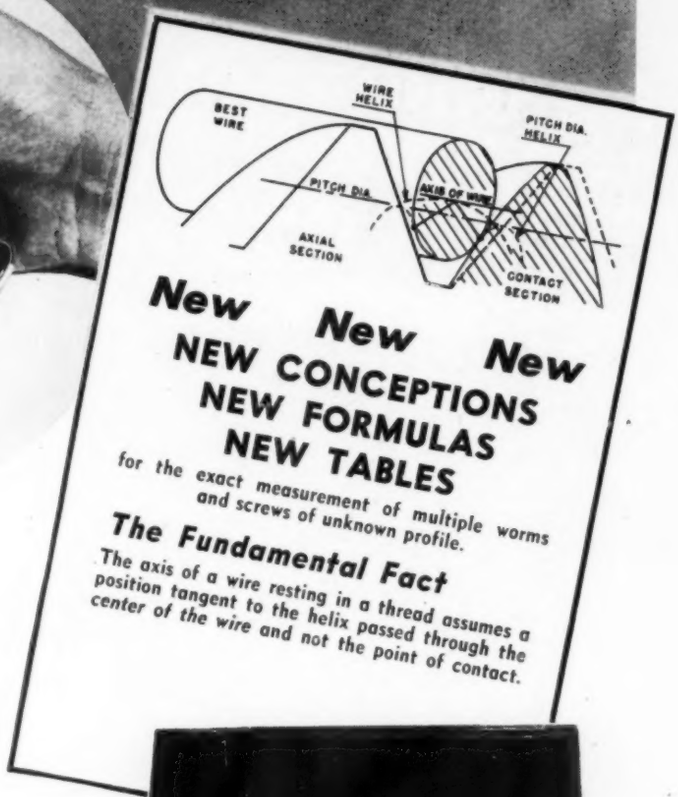
Van Keuren MEASURING WIRES

STANDARD EQUIPMENT... ...everywhere

Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.



New New New
NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES

for the exact measurement of multiple worms and screws of unknown profile.

The Fundamental Fact

The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

The 208-page 1948 Van Keuren Catalog and Handbook No. 34 includes new epoch making formulas and 10 new tables which reduce the computations for the exact measurement of any screw to a process of simple division. Your copy will be mailed promptly upon request.

Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

Price, High Speed Steel Wires..... $ 95.00
Price, Carboloy Wires..... 240.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

WINTER BROTHERS TAPS ARE DEPENDABLE!

QUALITY CONTROL

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

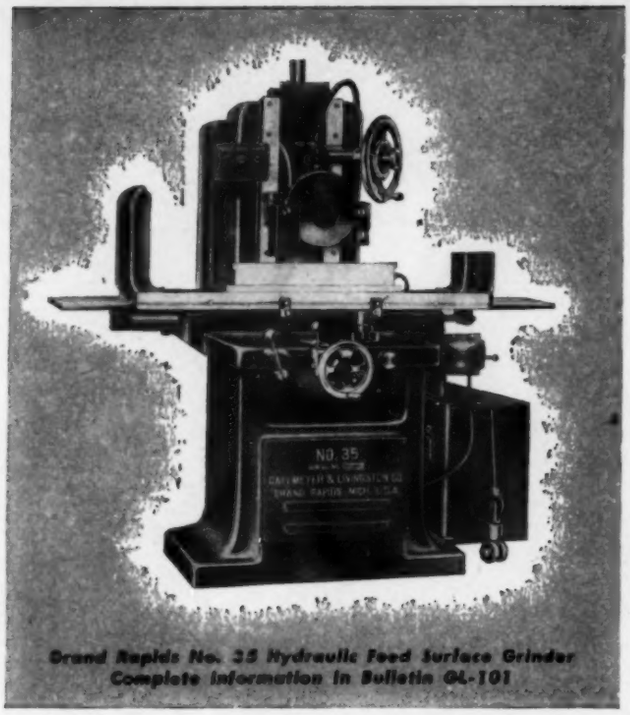
QUALITY control is one reason you get better performance and longer tool life when you specify Winter Taps. Winter's modern heat treating equipment includes automatic time and temperature controls that leave no important operation dependent on the human element. The quality of Winter Taps is safeguarded by rigid inspections at every step in the manufacturing process. Winter quality control is your assurance of more dependable performance always.

Winter Brothers COMPANY

ROCHESTER, MICH. and WRENTHAM, MASS. • Distributors in Principal Cities

A Division of the National Twist Drill and Tool Company • Branch Stores: San Francisco, Chicago, Detroit

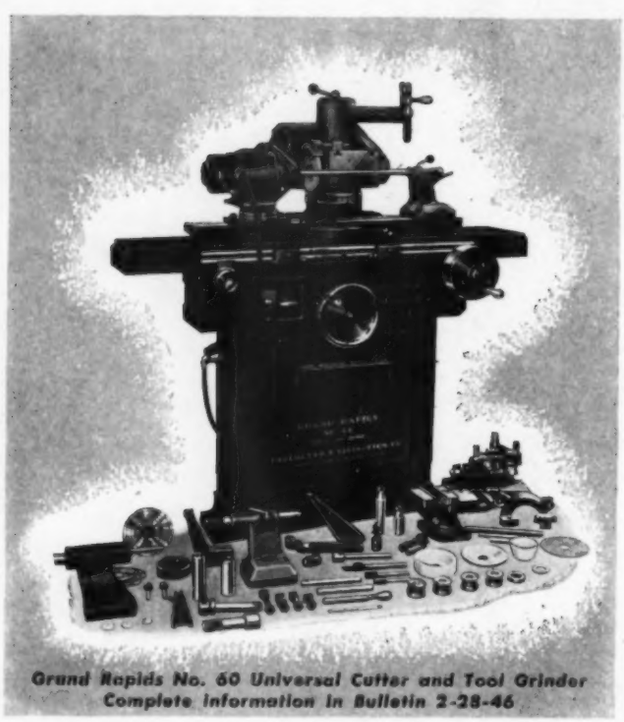
Every working day thousands of plants all over the world prove the....



Grand Rapids No. 35 Hydraulic Feed Surface Grinder
Complete information in Bulletin GL-101

Unqualified Excellence

of GRAND RAPIDS GRINDERS



Grand Rapids No. 60 Universal Cutter and Tool Grinder
Complete information in Bulletin 2-28-46

here's why • Every Grand Rapids Grinder, large or small, has every essential feature for fast, efficient, low-cost production. Refinements in construction details such as the massive castings, heavy, rigid spindles, separate spindle motors, assure years and years of trouble-free life.

Grand Rapids No. 60 Universal Cutter and Tool Grinder and No. 35 Grand Rapids Hydraulic Feed Surface Grinder will handle all of your tool room jobs from grinding of dies to sharpening all types of milling cutters, reamers and similar tools.

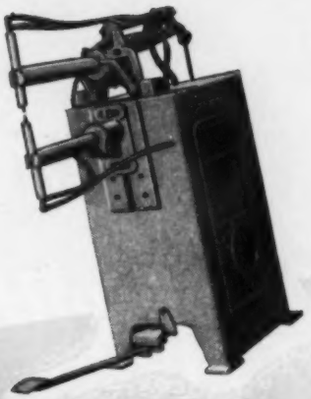
What "GRAND RAPIDS" quality means:

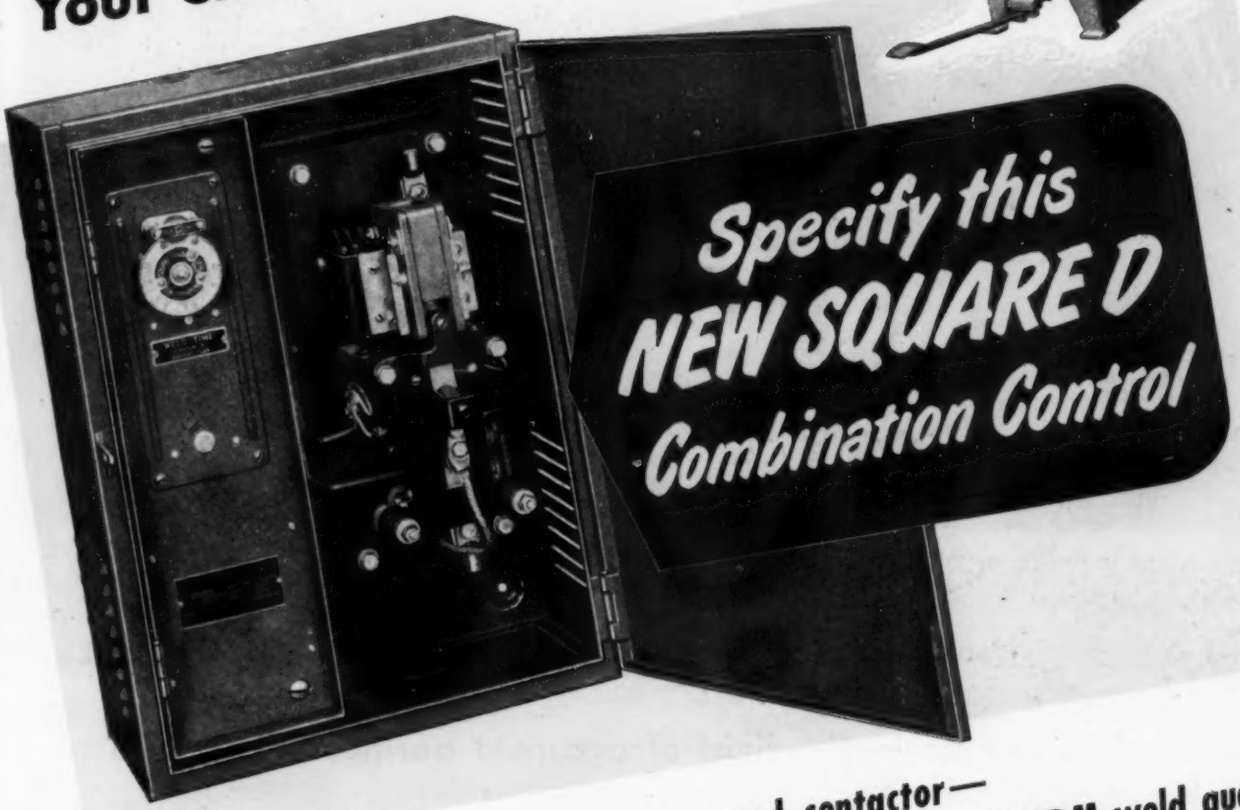
Gallmeyer & Livingston cast their own close-grained gray iron, machine to micrometric tolerances, and precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means top quality in grinding machinery.

GRAND RAPIDS
MANUFACTURED BY
GALLMEYER & LIVINGSTON CO.
GRAND RAPIDS, MICHIGAN, U.S.A.

GALLMEYER & LIVINGSTON COMPANY, 330 STRAIGHT AVENUE, S.W., GRAND RAPIDS 4, MICHIGAN

Here's the Economical Way to Modernize Your Small Spot Welders





Single enclosed unit includes timer and contactor—eliminates human element and assures UNIFORM weld quality

Class 8992 Type BBG-1 Controllers (illustrated above) are ideal for small foot-operated or motor-operated welders. A complete line of combination controllers for air-operated machines is also available.

Write Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin, for Bulletin 8992.

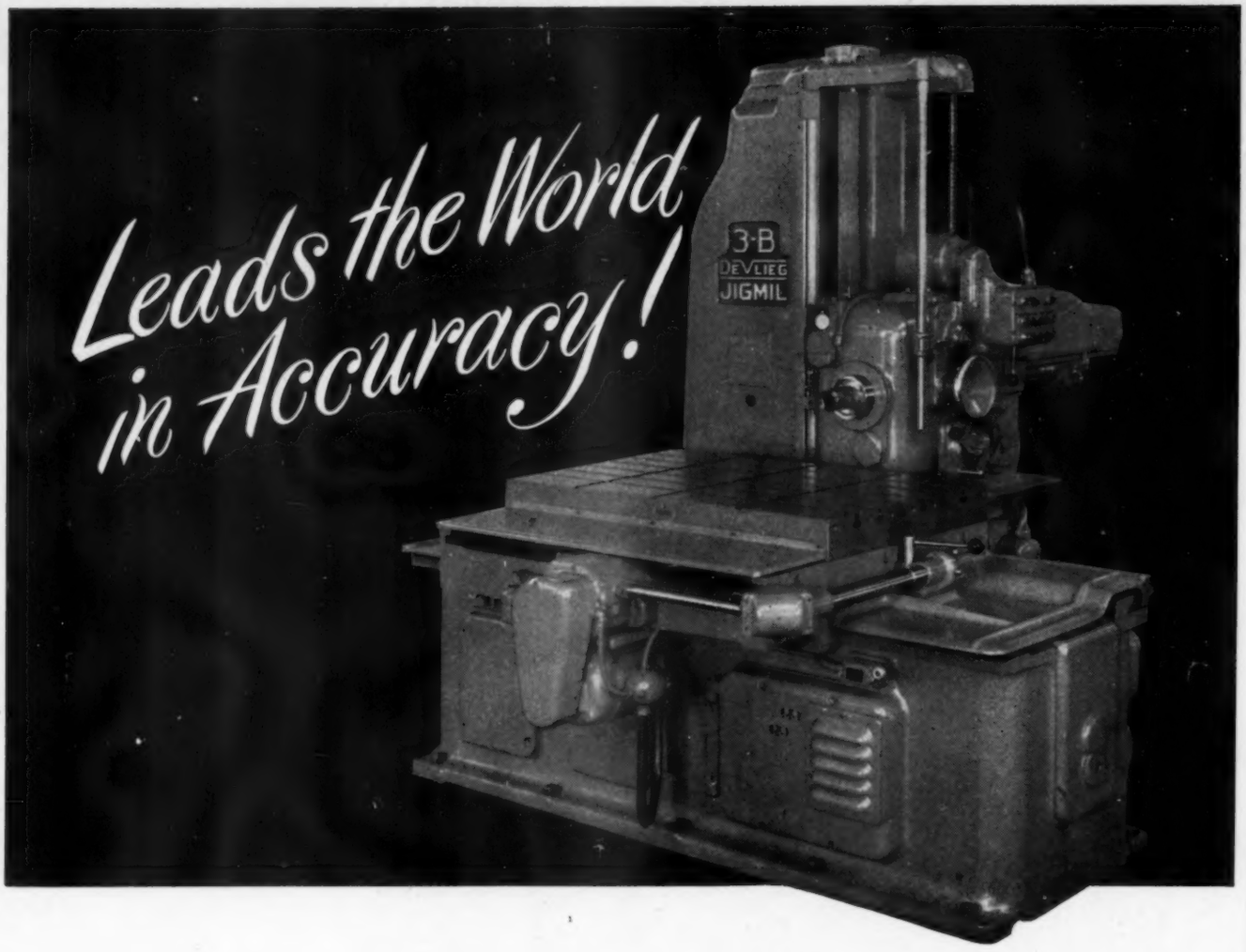
• Unit cost and spoilage go down—production goes up, where welding power is controlled automatically. It's a simple matter to modernize old machines with this single device which does the whole job automatically—does it quicker, better, and at low installation cost.

Check your welding equipment with the manufacturer or his representative. You may find that a small investment will bring a substantial improvement in both quality and output.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D CANADA, LTD., TORONTO, ONTARIO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.



The DeVlieg JIGMIL is now recognized as The World's Leader in the field of accurate boring, in addition to its unique capacity for high productivity on:

1. **Single part precision boring.**
2. **Tool, jig and die work.**
3. **Repetitive production work without jigs.**

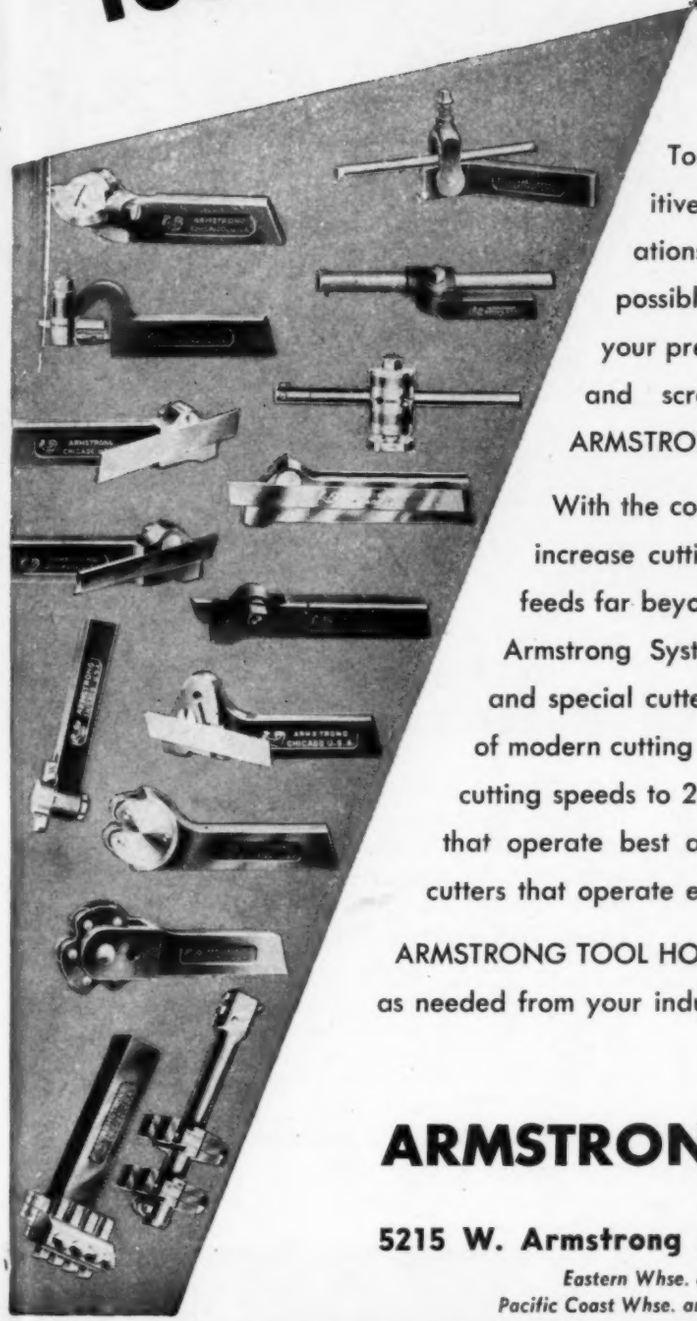
Write today for new descriptive booklet.

DEVLIEG JIGMIL

DeVLIEG MACHINE COMPANY

450 FAIR AVE., FERNDALE 20, (DETROIT) MICH.

ARMSTRONG TOOL HOLDERS



Produce more at lower cost with ARMSTRONG TOOL HOLDERS

Today's problem of producing more without prohibitive costs is easily answered on many machining operations by the Armstrong System of Tool Holders. It is possible to materially increase output per man hour on your present lathes, planers, slotters, shapers, turret lathes and screw machines, by simply using the correct ARMSTRONG TOOL HOLDER for each operation.

With the correct ARMSTRONG TOOL HOLDERS you not only increase cutting efficiency but can safely step up speeds and feeds far beyond those ordinarily used. Included in the modern Armstrong System are special ARMSTRONG TOOL HOLDERS and special cutter bits and blades that cover the complete range of modern cutting speeds. ARMSTRONG HIGH SPEED cutters for all cutting speeds to 200 f.p.m., ARMALOY (Cast alloy) Bits and Blades that operate best around 300 f.p.m. and ARMIDE (carbide-tipped) cutters that operate efficiently at rates as high as 600 f.p.m.

ARMSTRONG TOOL HOLDERS, Bits, Blades and Cutters, can be picked up as needed from your industrial distributor.

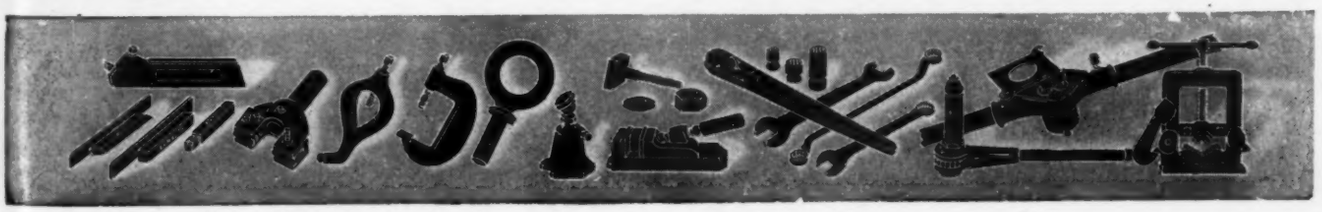
Write for Catalog

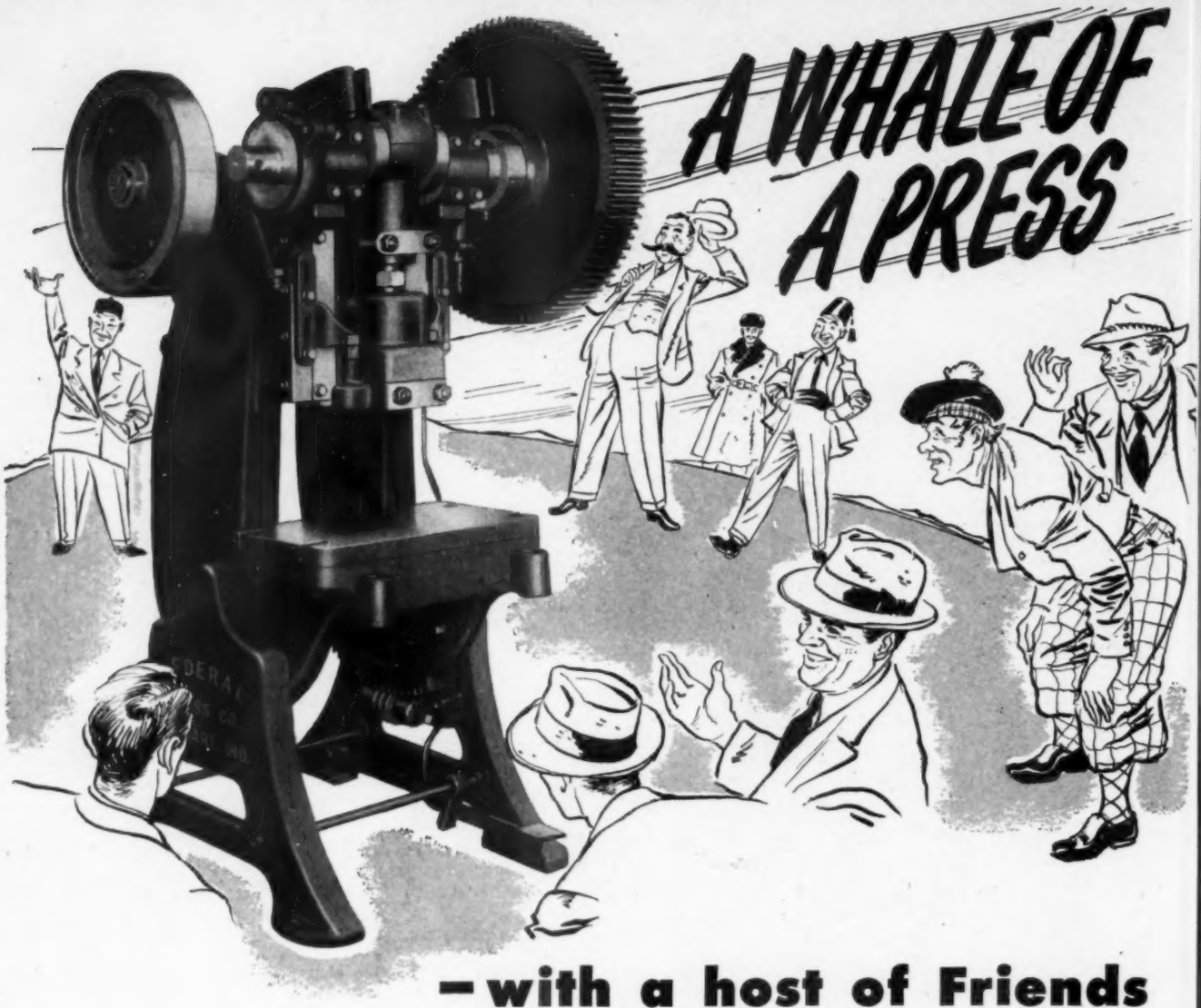
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. Armstrong Ave. **Chicago 30, U. S. A.**

Eastern Whse. and Sales: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Office: 1275 Mission St., San Francisco 3, Calif.





—with a host of Friends

Throughout the metal-working industry—in America and overseas—you'll find Federal Presses speeding production, cutting costs, eliminating accidents, performing a wide variety of jobs... and making more and more friends everyday, everywhere.

Production men prefer Federals because they are well designed, ruggedly built, fast, accurate, safe and dependable—capable of handling primary and secondary operations plus many types of assembly jobs.

Today more Federal Presses than ever before are speeding products to hungry markets. These precision machines may be the answer to your production problem. Write today for latest catalog showing the complete new Federal Press line.

REAL VALUE

Available in 8 sizes, from 6 to 80-ton capacity—Front Operated Recline—Timken Roller Bearing Flywheels—Frame-Anchored Knockout Bracket—Symmetrical Rams—Longer "V" Ways, Gibs—Oversize Crankshaft—Non-Repeat Clutch Mechanism—Safety Latch Spring

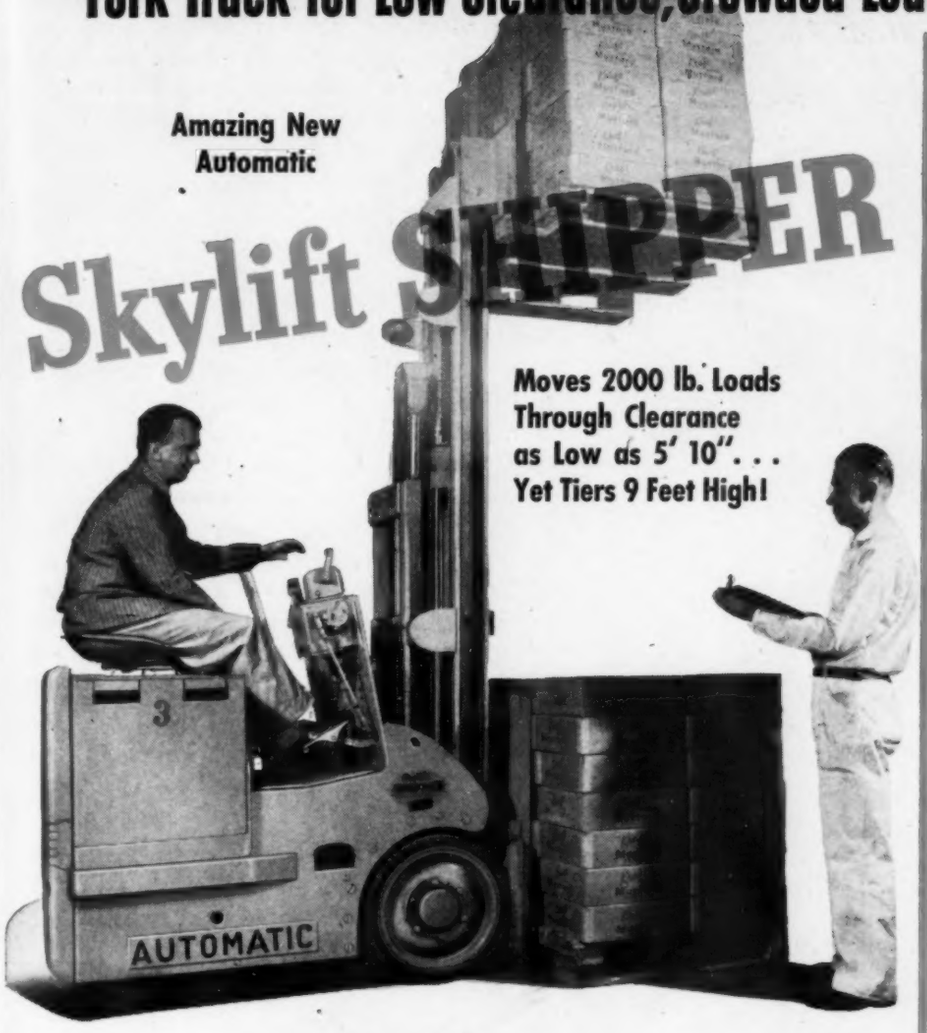
THE FEDERAL PRESS CO., 148 DIVISION ST., ELKHART, INDIANA—TEL. 2831

FEDERAL *Open back Inclinable* **PRESSES**

How Kraft Foods Company Expedites Material Handling with New Fork Truck for Low Clearance, Crowded Loading and Tiering!

Amazing New Automatic

Skylift SHIPPER



Moves 2000 lb. Loads Through Clearance as Low as 5′ 10″. . . Yet Tiers 9 Feet High!

Designed to exacting specifications of industry, amazing new Skylift SHIPPER accelerates material handling for KRAFT FOODS COMPANY in low clearance shipping operations! Pictures shown tell the story.

Now for the first time available to all industry, Skylift SHIPPER is the shortest fork truck ever designed—a truck that handles 2000 pound 48 inch loads on docks, storage areas and aisles too crowded or small for ordinary fork trucks.

Its low collapsed height of 68 inches, permits easy entry into trucks, trailers, refrigerator cars, cooler doors and other low-clearance portals.

Yet Skylift SHIPPER tiers 108 inches high for warehouse storage. With telescopic lift designed so forks and uprights are raised independently, forks raise 58 inches before uprights begin to extend. Thus you also can tier inside lowest trucks, and boxcars — impossible with trucks whose uprights raise simultaneously with forks.

It drives and operates like a car . . . lightens labor's load. Light weight, compact—and only 97¾ inches long, including 36 inch forks, Skylift SHIPPER is *the only single truck you can operate as a complete handling system in dock shipping operations and storage tiering too!* Let an ATCO specialist show you how much it will cut your shipping and handling costs. Mail coupon!

DRIVE INTO TRUCK WITH LOAD
KRAFT FOODS COMPANY expedites loading of low-door trucks and trailers with Skylift SHIPPER. Low collapsed height permits easy entry of a ton of MIRACLE WHIP SALAD DRESSING.

SPEEDS REFRIGERATOR CAR LOADING
Skylift SHIPPER loading a ton of KAY BRAND NATURAL CHEDDAR CHEESE into refrigerator car. Low doorways and narrow aisles are no handicap. And SHIPPER tiers ceiling high inside. Merchandise is moved more efficiently.

9 FOOT TIERING IN NARROWEST AISLES
KRAFT FOODS COMPANY gets extra free storage space by using Skylift SHIPPER for 9 foot high tiering. 2000 pound loads of food products are easily moved and neatly tiered.

Skylift SHIPPER
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
59 West 87th Street, Dept. A-8, Chicago 20, Ill.
Please mail me, without cost, complete facts about your new Skylift SHIPPER Electric Truck.
☐ Have an ATCO Specialist make a free survey of my material handling costs.

Company Name.....
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Street Address.....
City.....Zone.....State.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

"We tested them all... Airco 19-9 stainless steel electrodes produced the best welds..."

says Struthers-Wells Corporation, Warren, Pa.

In full they stated: "When we received the contract to fabricate these all-welded stainless steel soup kettles, we ran extensive tests to find the best stainless steel electrode for the job. Welds had to be porosity-free and have a smooth, uniform appearance because the vessels were to be machined down and polished. Airco 19-9 stainless steel electrodes produced the best welds of all electrodes tested. Tests showed a tensile strength of 85,000 lbs. per square inch and an extremely low corrosion rate loss of .00075" per month in boiling nitric acid."

Airco Stainless Steel electrodes are available with a titania coating for A.C.-D.C. application. Lime-type coatings for D.C. application are also available when required. Most operators prefer the A.C.-D.C. type because when used on A.C. arc blow is eliminated, which in turn, results in easier manipulation, more uniform arc action, and better appearance of deposit. Both produce an easily removed slag coating.

For further information regarding Airco's extensive stainless steel electrode line, or any other arc welding electrodes write for a copy of our latest Electrode Catalog. For your free copy address: Dept. AM 7813, Air Reduction, 60 East 42nd Street, New York 17, New York. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. Represented internationally by Airco Export Corporation.

AIRCO **AIR REDUCTION**

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HEADQUARTERS FOR OXYGEN, ACETYLENE AND OTHER GASES . . . CARBIDE . . . GAS WELDING AND CUTTING APPARATUS AND SUPPLIES . . . ARC WELDERS, ELECTRODES AND ACCESSORIES

FASTER DRAWS, DEEPER DRAWS

Two of the important advantages of BONDERIZING as an aid in drawing

Above: Seamless steel tubes coming from Bonderizing bath before drawing.

Right: Bonderized seamless steel tubing before greater percentage of reduction in this cold drawing operation. (Photos, courtesy Ohio Seamless Tube Co.)

More feet per minute, greater percentage of reduction per draw—this is what Bonderizing as an aid in drawing has accomplished for seamless steel tube manufacturers.

Bonderizing has three main actions in aiding the drawing of metal: Its great affinity for oil retains lubricant even under great pressures. It acts as a cushion between work and dies. Being nonmetallic, it greatly reduces galling, scoring and welding.

These actions result in the following important advantages: higher bench speeds; greater reductions; fewer operations; fewer process anneals; smoother finish; fewer rejects; longer tool life; greater production; allows wider range of steel properties; increases lubricant efficiency.

Bonderizing as an aid in drawing can save you time, money, and tools!

FREE TECHNICAL BULLETIN

Write today for your copy of "Bonderizing As An Aid In Drawing."

PARKER RUST PROOF COMPANY, 2196 East Milwaukee Ave., Detroit 11, Michigan

BONDERIZING Holds Paint to Metal — PARKER PROCESSES — **PARKERIZING** Inhibits Rust — PARKER PROCESSES — **PARCO LUBRIZING** Retards Wear on Friction Surfaces

ARTER

ANNOUNCES

Combination External and Internal Grinder-In-One

(Grenby Series 103)

Internal grinding head with work head swiveled.

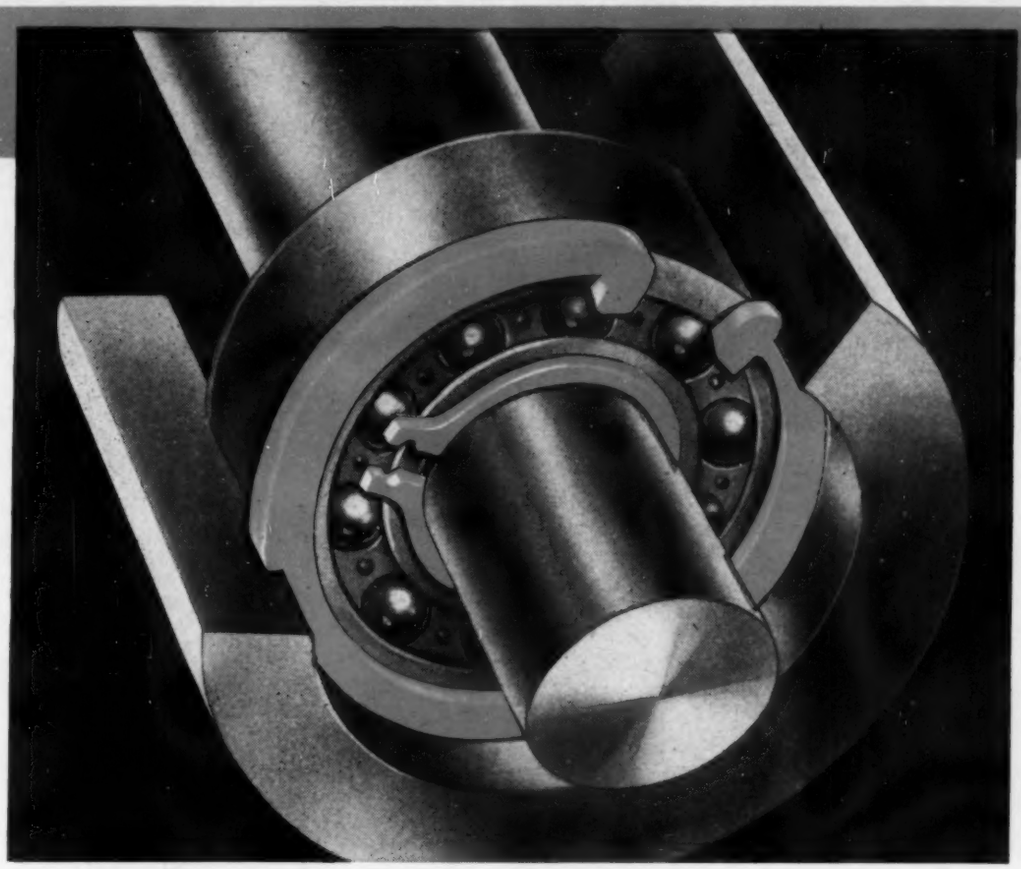
External head swiveled with quick collet closing attachment and radius dresser.

Now manufactured by ARTER, this hydraulic grinder can be obtained as an external grinder or as an internal grinder or with both grinding heads. External capacity — 3" diameter by 10" long; internal capacity — 1/8" to 3" dia. by 4" long. Swing-over table is 9".

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

•Save Time •Save Materials •Save Money!



Examine the designs of **all** your products and machines. No doubt you can use retaining rings on axles and in housings – not **only to save assembly time, but to save weight, parts and space.**

The use of these inexpensive yet efficient artificial shoulders is already widespread, and is increasing daily.

There are literally thousands of places in which redesigning for retaining rings can increase your profits and improve your products – uses ranging from heavy duty engines and drill presses to toys, gadgets and small parts of innumerable articles.

It's wasteful to cut down shafts to make shoulders. Redesign to groove smaller shafts and housings and use these high grade steel rings.

Let our engineers consult with you. Send for folders.

Don't pass up this opportunity to increase profits.

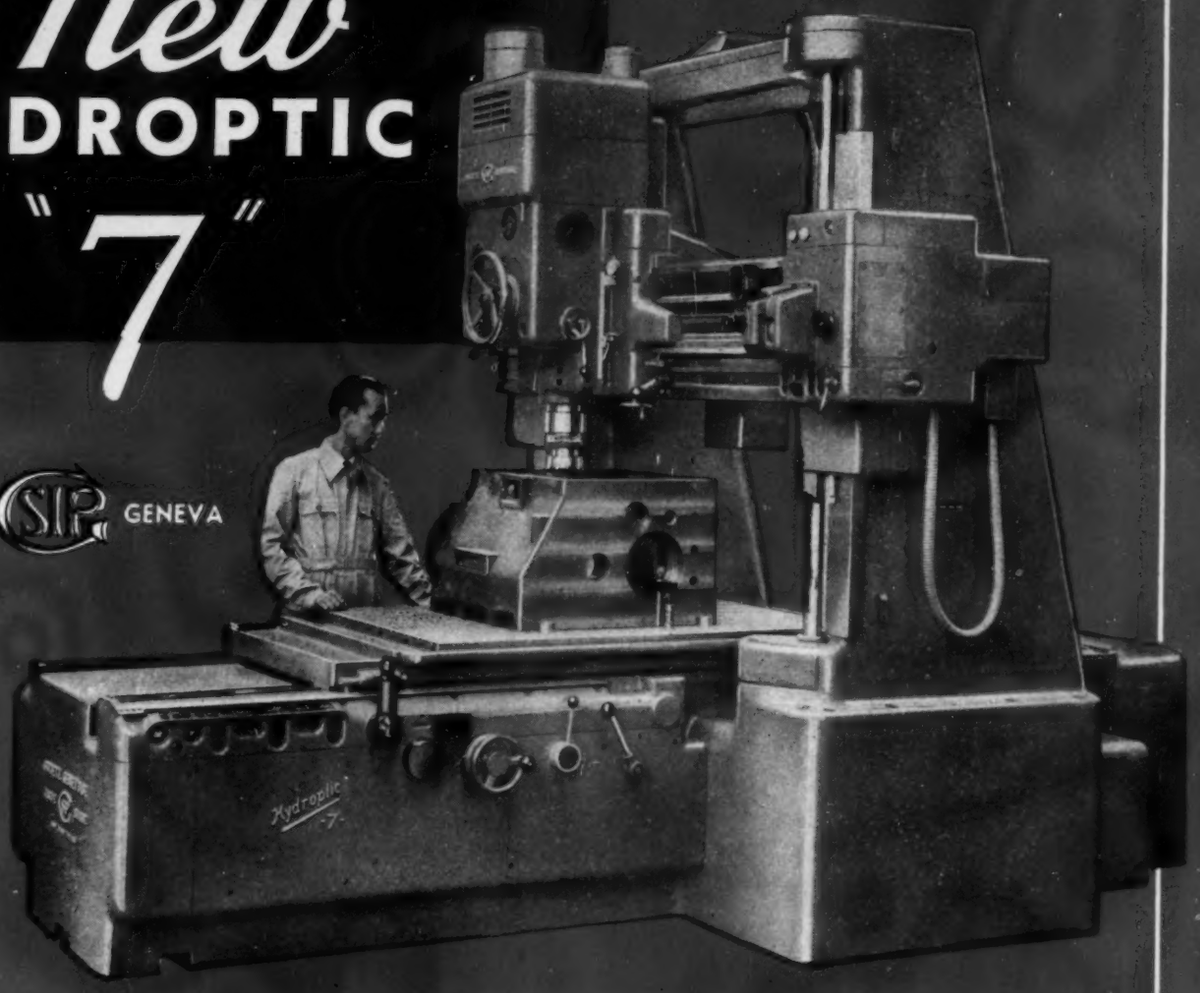
THE NATIONAL LOCK WASHER CO.

NEWARK 5, NEW JERSEY • MILWAUKEE 2, WISCONSIN

A new high in
PREFORMED
CARMET
CARBIDES
LAMINATION
PUNCH and DIE
INSERTS
What jobs have you
for CARMET to do?
Another first for Carmet! The cutting edges of this sectional die, blanking rotor and stator laminations from silicon steel, each consist of 36 preformed Carmet parts—and the production yield is far and away superior to all-steel construction. Wherever you need topmost life and wear-resistance in machine tools or parts, gages, bushings, etc., let us show you the great advantages you can secure in preformed Carmet carbides. Any shape or size—supplied either "as formed" or finish-ground, ready to use.
AL
Allegheny Ludlum Steel Corporation
CARBIDE ALLOYS DIVISION, Ferndale [Detroit] Michigan

INTRODUCING THE *New* HYDROPTIC "7"

MADE BY SIP GENEVA



WORLD FAMOUS HYDROPTIC ACCURACY WITHIN .0002"

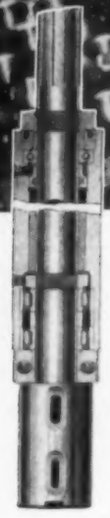
Built to meet the increased demands by American manufacturers for a precision Jig Boring and Milling Machine of larger capacity, the SIP HYDROPTIC "7" embodies all the unique features of the famed HYDROPTIC-B. In addition, larger table dimensions, a wide range of speeds and feeds, and rigid construction throughout raise productive capacity to the highest ever achieved. We will be pleased to have one of our engineers discuss the SIP HYDROPTIC "7" with you.

CONDENSED SPECIFICATIONS

Table working surface 61 1/2" x 40 1/2"
Hydraulic table feeds up to 12 in./min.
Drilling capacity in cast iron 2 3/8"
Boring capacity 10"
SIP built-in microscopic measuring system, free from wear and mechanical stress, assures accuracy for all settings of work table and spindle head within .0002"
Also — the HYDROPTIC "8", with same table and spindle head, plus a horizontal spindle head which permits jig boring and milling in three co-ordinates.

COSA CORPORATION CHRYSLER BUILDING NEW YORK 17, N. Y.

It could have been TOUGH on the operator—



Contributing to the unusually long trouble-free performance of Super Service Radial Drills is the spindle and sleeve construction. Note that the sleeve and its spindle supporting bearings feed down with the spindle so that no matter what length of feed is required or how far the spindle is extended from the head, it never feeds away from its supporting bearings, but is always rigidly supported by these bearings just above the spindle nose.

Power, stamina, accuracy and concentrated operator control were all required on this job.

One drilling and two fly cutting operations were performed. Size of holes: 5″, material 6½″ armor plate. From a minimum of fifty holes to several hundred were produced per piece.

The Cincinnati Bickford Super Service Radial Drills give a sustained accurate and speedy performance—with maximum ease to the operator.

Write for Bulletin R-29 for details on this modern powerful radial drill.

THE CINCINNATI BICKFORD TOOL CO.

RADIAL AND UPRIGHT DRILLING MACHINES

SUPER SERVICE

Radials 7½″ dia. col., 2½′ arm, to 36″ dia. col., 12′ arm.
General purpose Uprights, 21″ to 28″ sizes.
Production Uprights, 21″ to 28″.
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

For Quicker Production and Better Results, Use Sterling Cylindrical Grinding Wheels

Sterling

STERLING'S "Wheels of Industry" produce the accuracy and surface smoothness demanded by modern cylindrical grinding methods. Materials that are unusually hard are readily shaped and reduced to size when these superior grinding wheels are on the job.

One of the many reasons for Sterling's better grinding may be found in the bonds that are used. For example, Sterling's H and B Bonds, supplemented by several others, are helping create new production records from cylindrical grinding and crankshaft production. For tungsten carbides, Sterling's famous "23" Bond in Sterbon Wheels has wide application and is being recommended by grinding foremen everywhere.

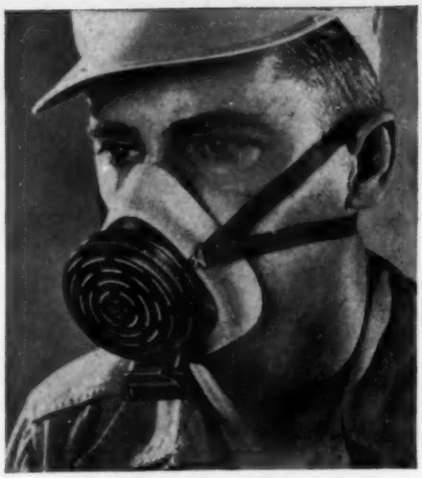
Take advantage of the better results you will gain from using Sterling Wheels on your difficult jobs. Our engineers will provide every assistance . . . write today!

"THE WHEELS OF INDUSTRY"

● This Sterling folder outlines many cylindrical grinding specifications. Sent free.

• STERLING ABRASIVES •
THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO
THE WHEELS OF INDUSTRY

NEW AO R-2000 RESPIRATOR



WITH THE CHEMICALLY TREATED FILTER

PROVIDES

*** 40 TIMES**

GREATER EFFICIENCY!

Visualize dust as small as 24 millionths of an inch diameter which the R-2000 filters out and you will appreciate the impetus given to respiratory protection which this new respirator provides! Comfort combines with protection, too, because the compact, chemically treated felt filter is as efficient as previous filters 8 times its size — thus permitting the use of a smaller filter container for increased front and side vision and greater wearing ease.

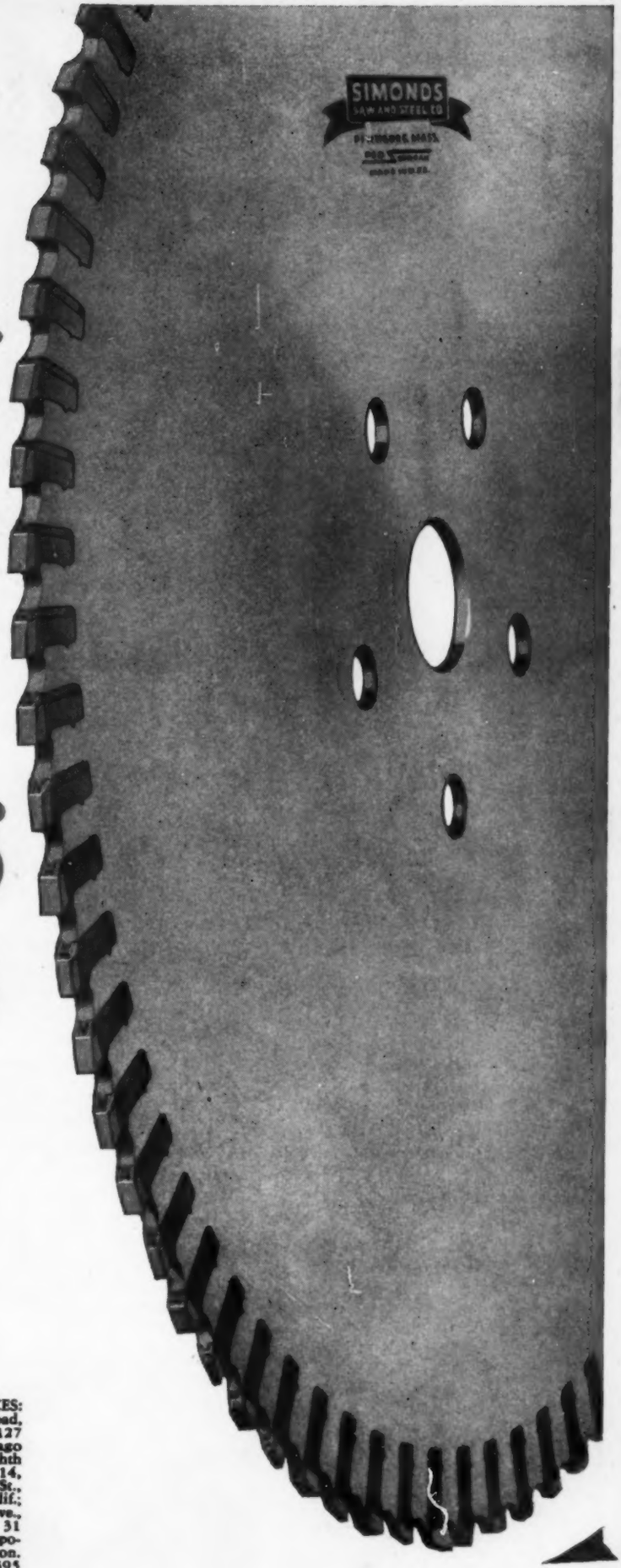
Other advantages include no increase in low breathing resistance — disposability of the filter — gauze pre-filter for extending filter life by barring the passage of larger dust and dirt particles. Special lightweight face shield may be used with the R-2000 to protect eyes and upper face. The respirator has the approval of the Bureau of Mines.

AO has a complete line of respirators for protection against light concentrations of gases and vapors.

*As compared with similar untreated filters.

American Optical COMPANY — *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL INDUSTRIAL CITIES



. . . the Original Saws with the
CURVED-GULLET TEETH
that permit Faster Speeds
and Feeds . . . Deeper Cuts

SIMONDS

Inserted-Tooth METAL-CUTTING Saws

Curved-gullet design . . . together with alternating square and bevel teeth . . . prevents welding of chips to the saw-plate. Each tooth is held in place by its own separate wedge, which gives extra strength to the saw. And Simonds' own special high-speed steel gives greater speed, feed, and depth of cut. So for uninterrupted operation, get Simonds I. T. Metal Saws from your Industrial Supply Distributor, or from the nearest Simonds office.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS — Special Electric Furnace Steels
SIMONDS ABRASIVE CO. — Grinding Wheels and Grains
SIMONDS CANADA SAW CO. LTD. — Simonds Products for Canada

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30.

ONE, or a MILLION!

GEARGRIND CONTRACT GRINDING SERVICE

Don't Scrap Those Gears Or Splines!

Before scrapping any gears or splines because of distortion in heat treat or errors in machining, ask us about SALVAGE GRINDING. We have saved our customers thousands of dollars by putting our superb grinding facilities and years of experience into salvaging operations.

You can save time and expense by using the Geargrind Contract Grinding Service.

What you believe to be a complex problem may be a simple grinding operation to us, as the work is done on machines manufactured by us, giving us full advantage of their versatility and speed.

Write for Full Information

For a single piece or production runs, GEARGRIND has the plant facilities, equipment and know-how to meet your requirements on all types of Formed Wheel Grinding. Your work will be accurate, finely finished, and delivered on time. This service is available for:

External Spur Gears

From ½" to 33" O.D. 1¼ to 64 pitch. Pinion gears up to 60" between centers. Any desired pressure angle.

Internal Involute Spur Gears and Splines

From 2½" to 17" P.D. 4 to 64 pitch. Maximum face width 5". Any desired pressure angle. Number of teeth up to 200. Maximum O.D. 26". V shaped Splines of any included angle.

External Helical Gears

From 1" to 13¾" O.D. 4 to 28 pitch. Face width up to 2¾". Left or right hand helix. Minimum lead 8¼". Any desired pressure angle.

Splines and Serrations

Up to 16" diameter, 60" between centers, parallel sides or V shaped of any included angle.

Internal Helical Gears

We have limited facilities for grinding this type gear.

We have ground experimental gears with 160 teeth, 10 diametral pitch. 22°-30' pressure angle. 26° helix angle. 17¾" O.D. We invite inquiries for this type of work.

Straight or Oblique Racks

Lengths up to 26". Width of work up to 4". From 3 to 32 pitch. Any desired pressure angle.

We also produce master gears, spline gauges, spline work arbors, plug gauges, cluster gears and gears of cramped design, punches, dies, sprockets, and master index plates. Salvage grinding of gears, which due to distortion in heat treat or errors in machining would otherwise be considered scrap.

Write, wire or phone for full information.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

"Which Squirrel-Cage Motor Shall I Buy?"

Open-Type? This general-purpose squirrel-cage motor meets about 9 out of every 10 application requirements; so chances are it's the design you'll select. Allis-Chalmers builds generously proportioned, rugged *open-type* squirrel-cage motors in sizes from 1 hp to the largest practical requirement.

Splash-Proof? Where operating conditions are conducive to entrance of particles or liquids into ordinary motors from either top or sides, Allis-Chalmers *splash-proof* squirrel-cage motors may be your best buy. They're designed to *exclude* top or side directed particles and liquids. Sizes 1 hp to the largest.

Vertical? or Flange-Type? *Either* can solve a space problem. *Vertical* motors (sizes 1 hp to largest) for vertical drives. *Flange-mounted* for side or angle drives. In both types bearings and closures are designed to prevent grease escapement. Mounting flange for attaching to your base can be provided.

Totally-Enclosed? Explosion-Proof? Completely weather-proof and fan-cooled, these motors are built to beat abrasive dust, dirt and corrosive fumes, or moisture conditions that cause windings in ordinary motors to deteriorate. *Explosion-proof type* for oil refineries, paint, varnish or lacquer plants, etc.; Underwriters approved; reduce hazards in explosive or dust atmospheres. Either type built from 1 hp and up.

Are Motor Decisions More Important Today?

YOU BET THEY ARE! One *obvious* reason is the need for keeping costs down. Another is that in the rush to fill demand much equipment is being misapplied; making it harder to maintain profits not alone today, but tomorrow, the next day and the next year—as long as misapplication continues!

That's why it's important to take a good look at motors — their characteristics — your equipment — power source and surroundings — *before* you buy and apply! If you're in doubt, don't take chances — call a motor expert! ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2327

A CENTURY OF SERVICE to Industry THAT MADE America Great

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment-
Biggest of All in Range of Industrial Products

Remington Rand

MACHINES FOR MANAGEMENT

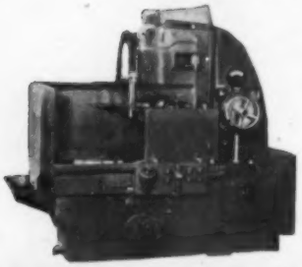
WATCHMAKER PRECISION characterizes every phase of Remington Rand's activities . . . PRECISION in advanced engineering . . . PRECISION in manufacturing hundreds of thousands of intricate assemblies to serve the world's business.

they PUT IT ON THE BLANCHARD

THE JOB: GRINDING BOTH SIDES OF PRINT WHEELS — TO LIMITS ±.00025". Material is No. 1010 Steel — 2.660" diameter x .100" final thickness. Stock removal per side is .009" to .013".

THE METHOD: *Remington Rand Engineers chose a No. 18 Blanchard Surface Grinder* . . . 113 print wheels are simply and quickly placed on the 36" magnetic chuck. . . .

THE RESULT: *which of course governed the choice of the most suitable machine* . . . two chuckloads or 226 accurately sized pieces (452 surfaces) per hour. Difficult grinding jobs are made simple with Blanchard Grinders.



Whether your flat surface grinding job is simple or seemingly difficult, Blanchard Engineers will gladly assist you in arriving at the most profitable solution. Avail yourself of this free, non-obligatory service. You'll find the whole story in the booklet shown at the side.

BLANCHARD

The BLANCHARD MACHINE COMPANY

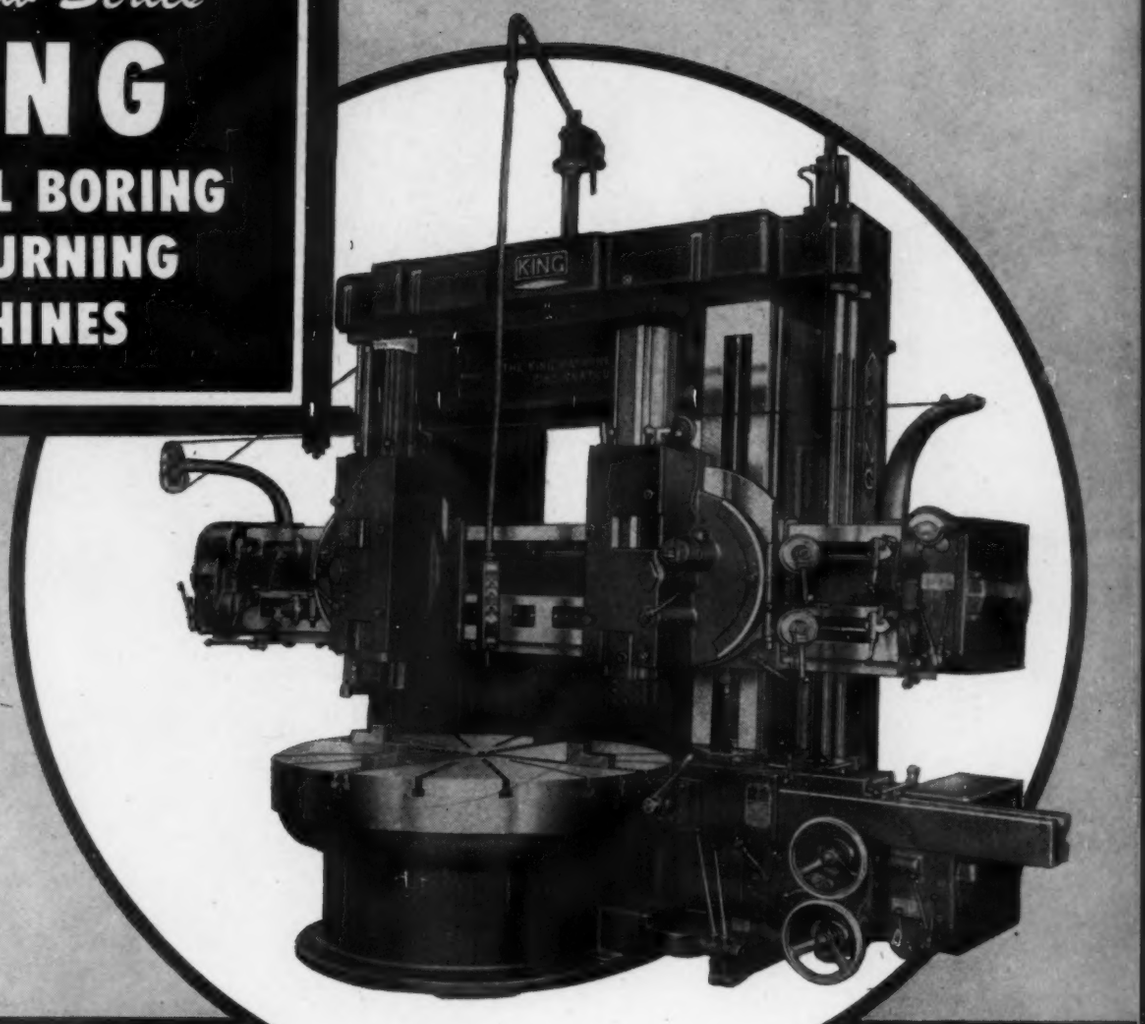
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

CARBIDE TOOLS

present no problems with New Series

KING

VERTICAL BORING AND TURNING MACHINES



● The chief reason for the successful use of high speed carbide tools on the new Series KING Machines stems from the increased weight throughout and the resultant rigidity of its sturdy construction.

This is clearly indicated in the massive rectangular type ram heads—saddle for ram head square locked and fitted with four tapered gibs for accurate adjustment—and the heavy tie plate across the swivel.

Add to this the ease and convenience of control afforded by location of all control levers at the front of the machine within easy reach of operator at all times.

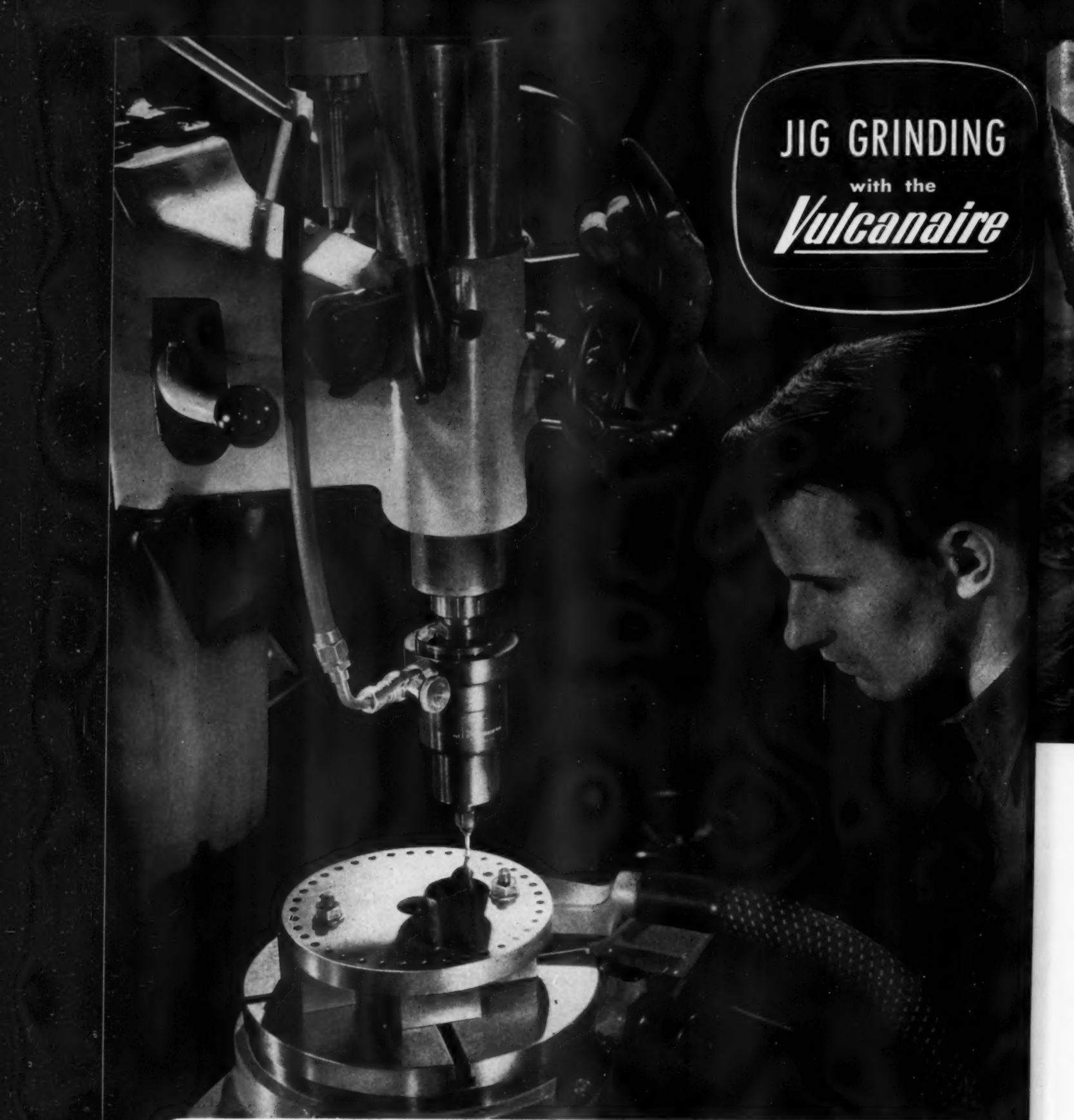
All of which adds up to greater production and lower costs on your vertical boring and turning operations with a new series KING.

Available in a full range of sizes from 30" to 144". Write for details.

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines and Sebastian Lathes



JIG GRINDING with the *Vulcanaire*

WHEN jig grinding is needed you can have it quickly and economically with the VULCANAIRE.. This precision attachment can be placed in the spindle of your jig borer (or other machine tools) and you can accurately locate and finish grind holes in hardened steel to "tenths" at controlled speeds ranging up to 65,000 RPM. The VULCANAIRE is a precision instrument that takes the high cost out of jig grinding.

* * *

Write for detailed literature—or for a quotation, please advise the name and type of machine on which you would like to use the VULCANAIRE.

VULCAN TOOL COMPANY • DAYTON 10 • OHIO

Metal Working Costs can go DOWN, too!

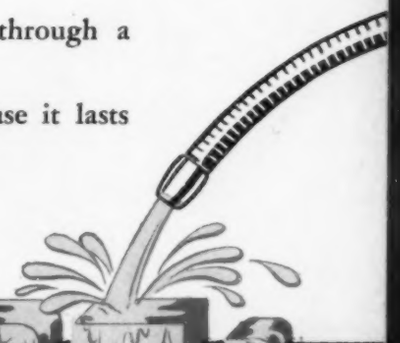
Yes, costs go *down* when you switch to Cimcool. This new kind of cutting fluid —this *chemical emulsion*—actually reduces costs and increases profits three definite ways:

1. LONGER TOOL LIFE (and therefore less down time) because of Cimcool's unique *chemical lubricity.*

2. FASTER SPEEDS are possible because Cimcool cools faster—through a *physical change* in the cutting fluid itself.

3. CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It isn't subject to rancidity. Its low surface tension and non-adhesion to work and chips virtually eliminate carry off.

CIMCOOL DIVISION, THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U.S.A.



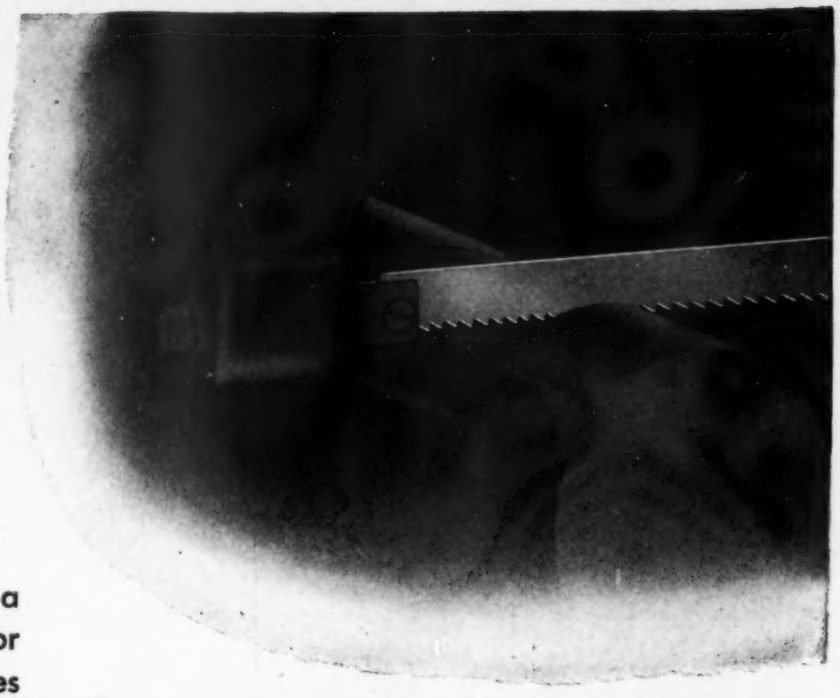
CIMCOOL *for* 85%

Trademark Reg. U.S. Pat. Off.

OF ALL METAL WORKING JOBS

Which is better for you...

A Hack Saw, or a Band Saw?



Only MARVEL can give a strictly impartial answer for only MARVEL manufactures *both* hack sawing machines and metal cutting band sawing machines, and manufactures *both* hack saw blades and metal cutting band saw blades. For this reason, your local MARVEL Sawing Engineer is best qualified to analyze your particular metal-sawing or cutting-off problems and recommend, without bias, the type saw-metal-sawing or cutting-off problems and recommend, without bias, the type sawing machine and correct blade to do your work most efficiently.

MARVEL recommendations are based on actual operational laboratory and field tests covering *cutting-off time and costs* for bars, tubes, and shapes on all types of sawing machines and with various blades. (It is significant that time factors of various so-called "fast" machines vary as much as 4 to 1 on many operations, while costs differ as much as 6 to 1.)

•

Write for new catalog C48, and if you feel that our field service engineer may be helpful to you, let us know.

•

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. CHICAGO 39, U.S.A.

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades

There is no better-paying investment than the right tools for the job

HERE AT "ACCURACY HEADQUARTERS" ARE THE RIGHT TOOLS

— MACHINE TOOLS, SMALL TOOLS, GAGES, AND KELLERFLEX EQUIPMENT —

FOR A WIDE VARIETY OF PRECISION METALWORKING JOBS.

CALL ON PRATT & WHITNEY SALES ENGINEERS

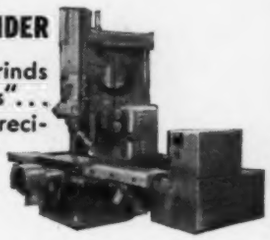
FOR HELP THAT WILL GIVE YOU

THE BEST RETURN ON YOUR INVESTMENT

NEW DEVELOPMENTS TO SPEED ACCURATE METALWORKING

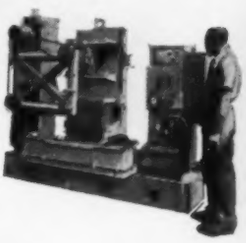
P&W JIG GRINDER

All-electric! Grinds holes to "tenths"... matches the precision of P&W's long-famous Jig Borer.



P&W AUTOMATIC DUPLICATOR

Mills exact duplicates of masters automatically. Mechanically tracer controlled.



KELLER BG-22

Fastest tracer-milling machine ever made . . . with unique all-electric control.

P&W ROTARY TABLES FOR HORIZONTAL BORING

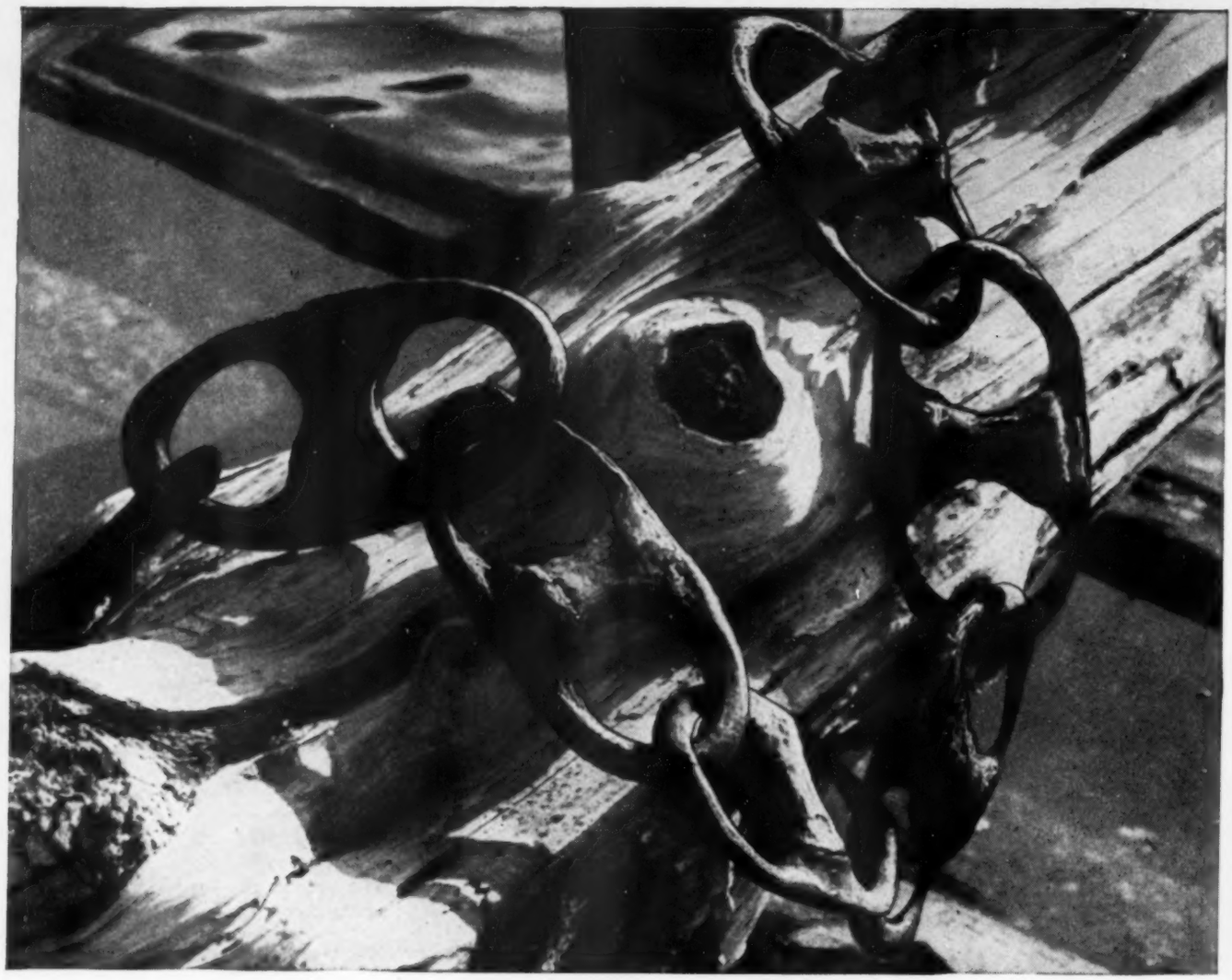
Permit drilling, tapping, boring and face-milling of all exposed surfaces — *regardless of angle* — without making set-up changes.

WRITE for descriptive literature on these new cost-cutting developments — the *right* tools for the job.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT



CHAIN REACTION

VERY OFTEN a single industrial lubrication problem in your plant, if allowed to run unchecked, can set off a whole chain of costly production hold-ups.

Rust or corrosion, for example, frequently unnoticed in its insidious early stages, may soon affect a vital piece of equipment or machine. Then, suddenly, an entire production line is thrown out of balance.

Furnishing expert counsel and advice on rust and corrosion problems is only one of the many ways Cities Service lubrication engineers can help you. These cost-conscious, production-minded experts are "professional worriers." Their recommendations for exactly the right grade of oils, greases, solvents or other petroleum products to meet your individual needs are based upon a sound, intelligent "situation analysis" made on the spot and backed by experience.

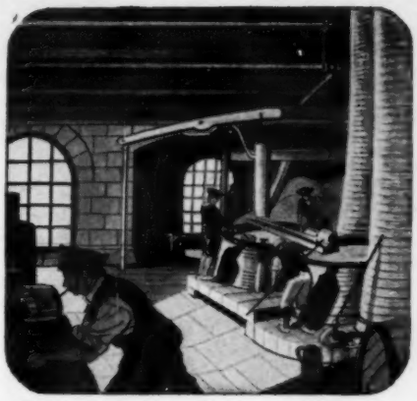
Moreover, behind the recommendations of a Cities Service lubrication engineer is the solid background of a company whose roots go back almost to the beginnings of the petroleum industry.

CITIES SERVICE

Why not let a Cities Service lubrication engineer do your "worrying" on all your industrial lubrication problems. Phone, wire or write Cities Service, Sixty Wall Tower, New York 5, N.Y. Room 1.

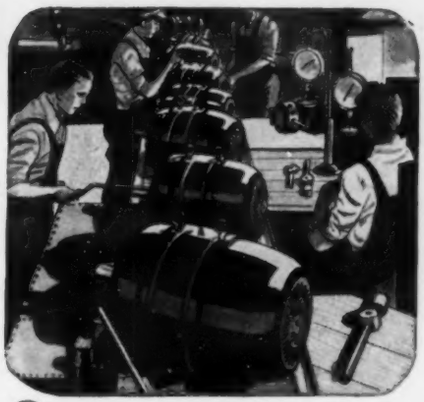
CITIES SERVICE *Means* GREAT *Service*

ALL THE WAY FROM THE REFINERY TO YOUR PLANT



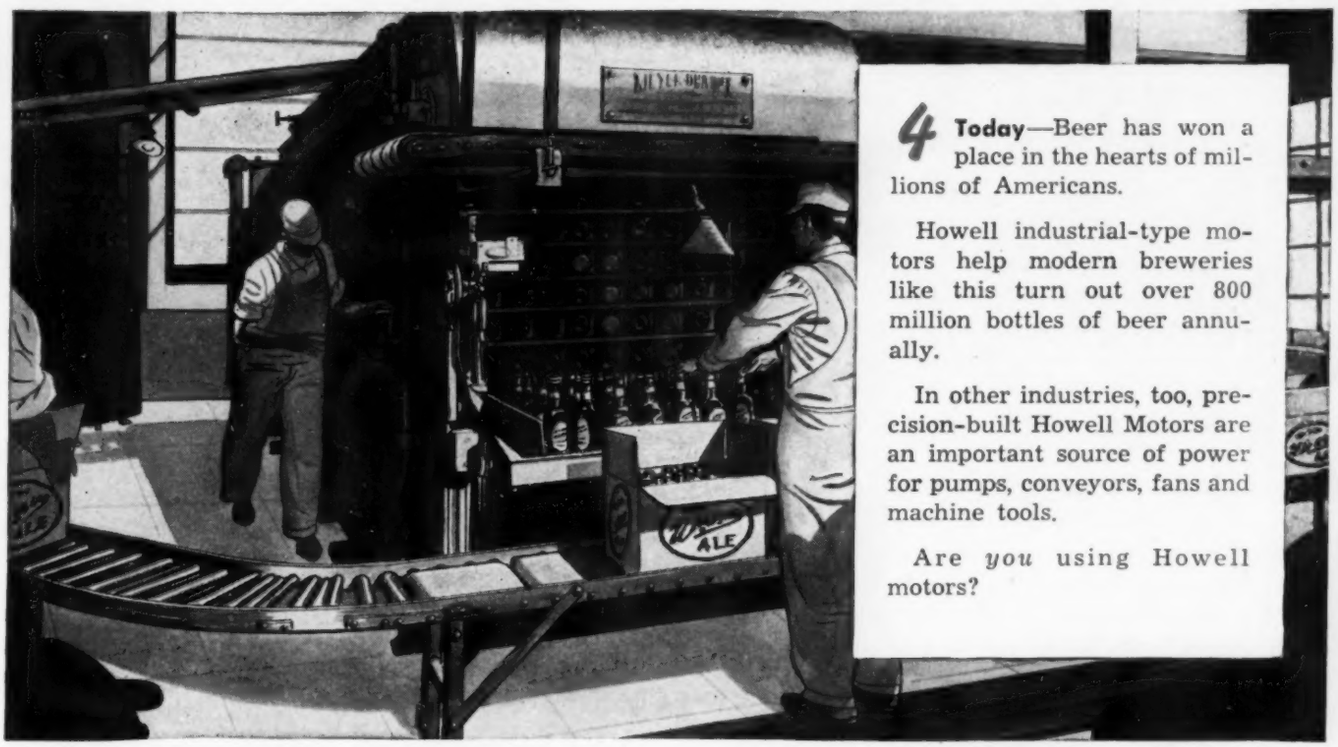
1 **1633**—First brewery in America was built in New York City near what is now Wall Street. Our Founding Fathers fostered this "beverage of moderation" by low taxes on domestic beer.

2 **1842**—Lager beer arrived and for years demand far exceeded supply. Improved methods of bottling, capping and handling that were to make brewing "big business" were still to come.



3 **1915**—Howell industrial-type "Red Band" motors appeared. The advent of low-cost electric power made modern bottling possible, upped beer production, cut costs. Brewing boomed!

NOW . . . BEER BELONGS



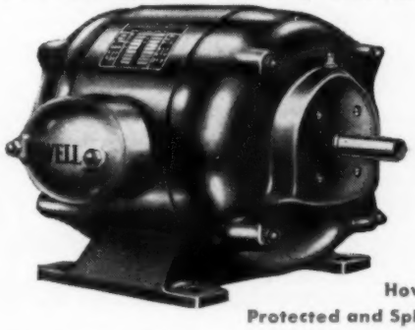
4 **Today**—Beer has won a place in the hearts of millions of Americans.

Howell industrial-type motors help modern breweries like this turn out over 800 million bottles of beer annually.

In other industries, too, precision-built Howell Motors are an important source of power for pumps, conveyors, fans and machine tools.

Are *you* using Howell motors?

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



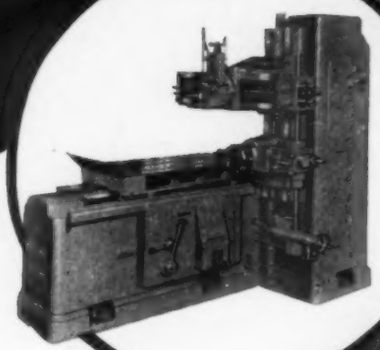
Howell
Protected and Splash-proof Motors

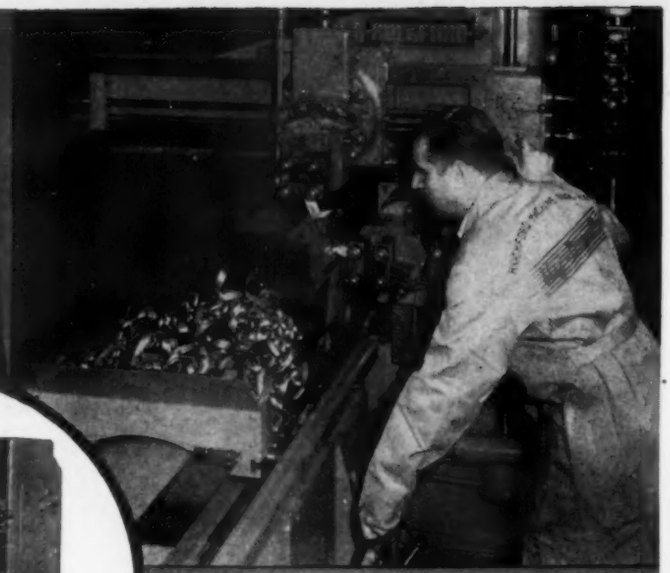
HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

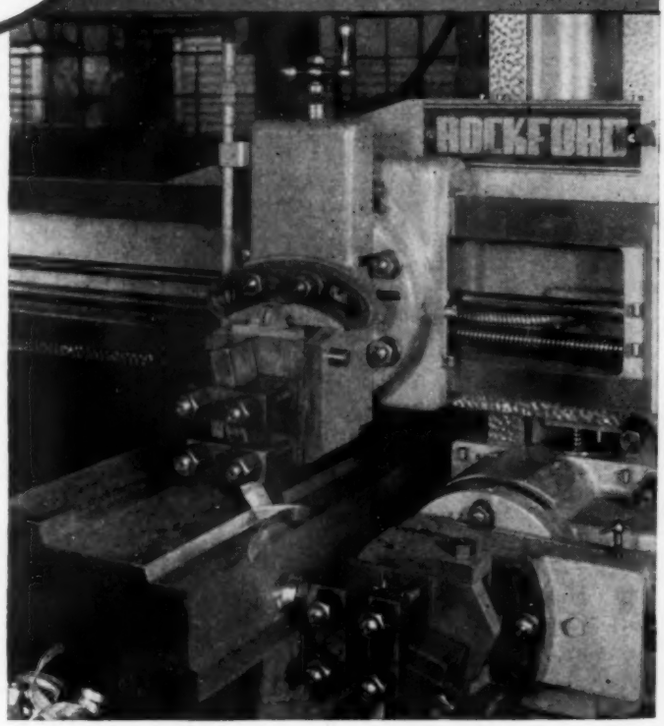
Manufacturers of Quality Industrial Type Motors Since 1915

Complete REDESIGN





THE NEW ROCKFORD *Hy-Draulic* 36" OPENSIDE SHAPER



for

- **increased range of application**
- **easier set-up and operation . . .**

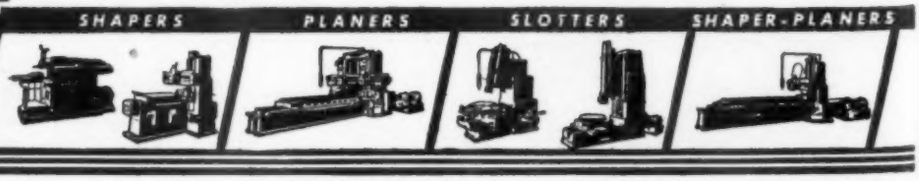
The redesigned Rockford Hy-Draulic 36" Openside Shaper offers two important new advantages: (1) Range of application is greater due to the new heavier Column and Rail, and the new redesigned Side Head . . . and (2) Ease of set-up and operation is improved because of such features as dual controls for table operation from either side of table. As extra equipment power rail elevation is available to further simplify set-up work. All the other advantages typical of any Rockford Hy-Draulic machine are provided by the new 36" Openside Shaper . . . such as fast cutting and return strokes with infinite speed selection between wide range low and high.

4720

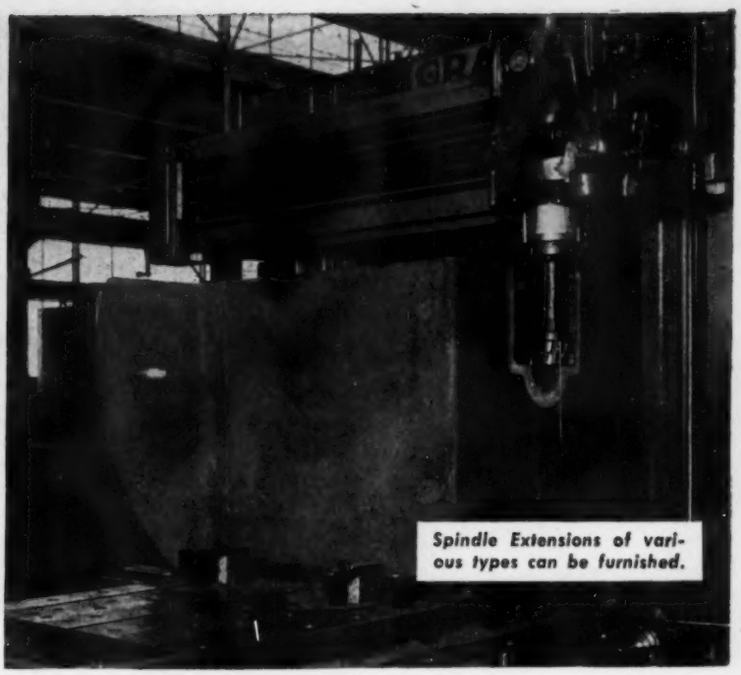
Let a Rockford Hy-Draulic sales engineer give you the point-for-point story of the new Rockford Hy-Draulic 36" Openside Shaper advantages. *See for yourself . . . or write for Bulletin 4441.*

ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

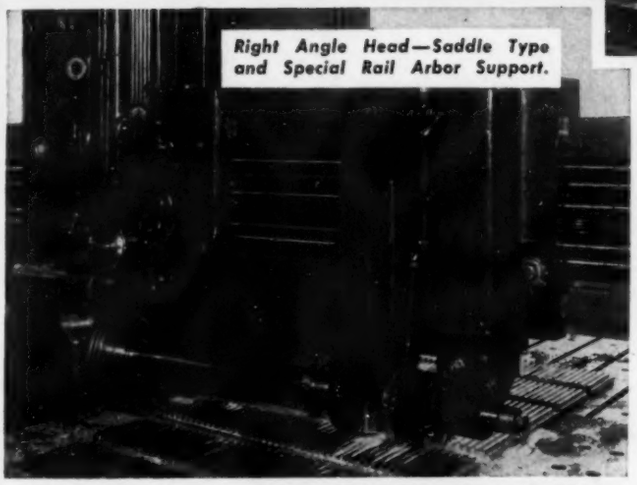
Hy-Draulic
REG. U.S. PAT. OFF.



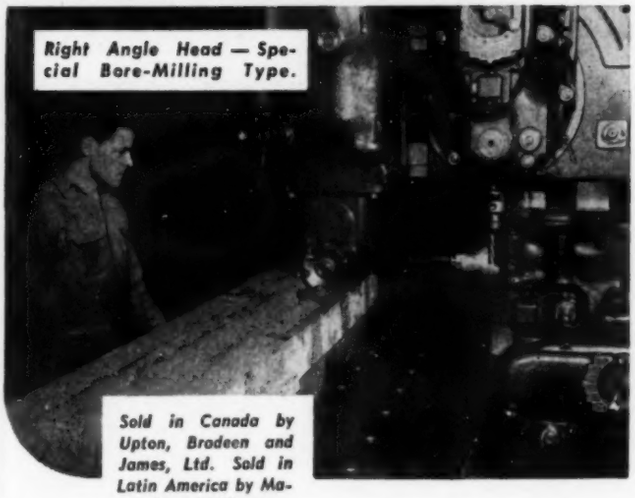
Side head fastened to rail and fed up and down as a unit. Note Arbor support mounted on rail.



Spindle Extensions of various types can be furnished.



Right Angle Head—Saddle Type and Special Rail Arbor Support.



Right Angle Head — Special Bore-Milling Type.

Sold in Canada by Upton, Brodeen and James, Ltd. Sold in Latin America by Machine Affiliates

The

GRAY

UNIT HEAD MILLING MACHINE

can be equipped with supplemental equipment and special attachments that add greatly to the range and variety of work that can be handled to the best possible advantage.

Write for fully illustrated descriptive Bulletin No. 51.

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

STANDARD ENGINEERS NOTEBOOK

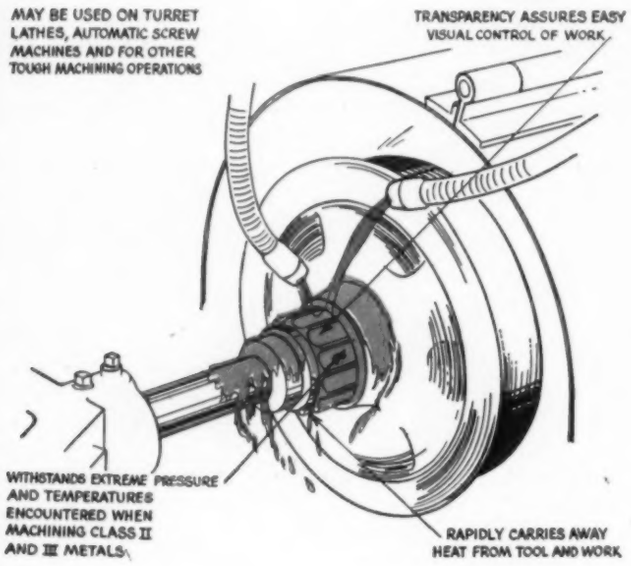
CALOL RPM

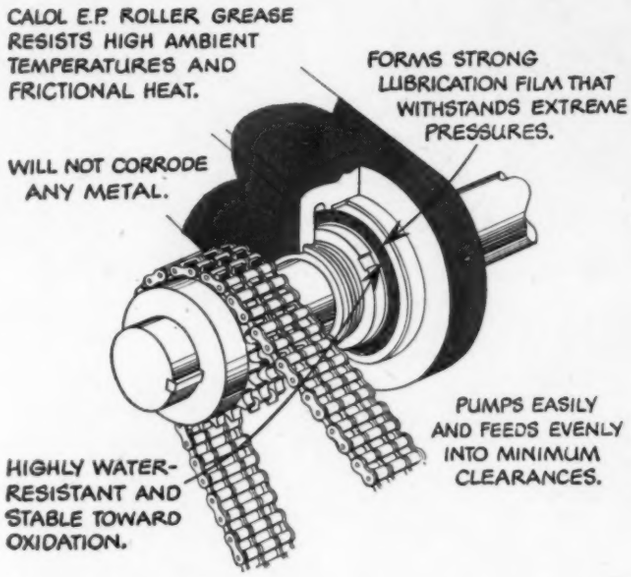
Potent cutting oil produces good surface finish

When machining Class II or Class III metals many operators have found the high lubricating value and extreme pressure quality of Calol Cutting Oil—20TA ideal for producing the desired finish. Because it is transparent, Calol Cutting Oil—20TA affords a machine operator complete visual control of work.

This special cutting oil is made from highly refined oils and compounds which give it unusual potency and transparency. It is an excellent coolant —carries heat away rapidly from tools and gives them longer service life.

Recommended for tough work, Calol Cutting Oil—20TA is used on turret lathes, automatic screw machines, etc. It can be used when machining brass or bronze where slight staining is not objectionable and work is cleaned or pickled after machining.


MAY BE USED ON TURRET LATHES, AUTOMATIC SCREW MACHINES AND FOR OTHER TOUGH MACHINING OPERATIONS
TRANSPARENCY ASSURES EASY VISUAL CONTROL OF WORK
WITHSTANDS EXTREME PRESSURE AND TEMPERATURES ENCOUNTERED WHEN MACHINING CLASS II AND III METALS
RAPIDLY CARRIES AWAY HEAT FROM TOOL AND WORK


CALOL E.P. ROLLER GREASE RESISTS HIGH AMBIENT TEMPERATURES AND FRICTIONAL HEAT.
FORMS STRONG LUBRICATION FILM THAT WITHSTANDS EXTREME PRESSURES.
WILL NOT CORRODE ANY METAL.
PUMPS EASILY AND FEEDS EVENLY INTO MINIMUM CLEARANCES.
HIGHLY WATER-RESISTANT AND STABLE TOWARD OXIDATION.

Special grease carries heavy-duty loads

When any type of heavy-duty, grease-lubricated ball or roller bearings are subjected to extreme pressures, high temperatures, or moisture, Calol E.P. Roller Grease will solve the severe lubrication problems. It was originally developed for anti-friction roll neck bearings in steel mills, but is used with complete satisfaction on heavy-duty anti-friction bearings in many other plants.

Calol E.P. Roller Grease is made from heavy bodied oil and special soap stocks wherein are incorporated extreme pressure additives. It is very cohesive and stable. Its tough film withstands both shock loads and pressures far higher than other greases used on anti-friction bearings.

Fully moisture resistant, Calol E.P. Roller Grease resists oxidation, is non-injurious to bearing metals, and handles easily in grease pressure systems at low temperatures.

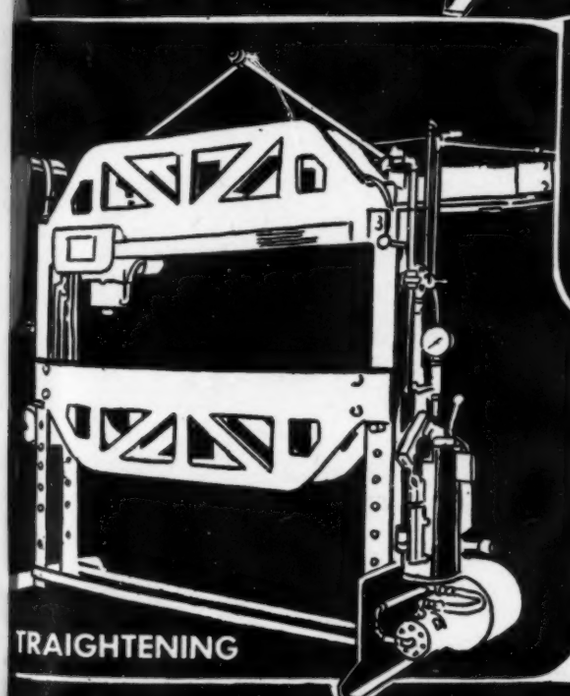
For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

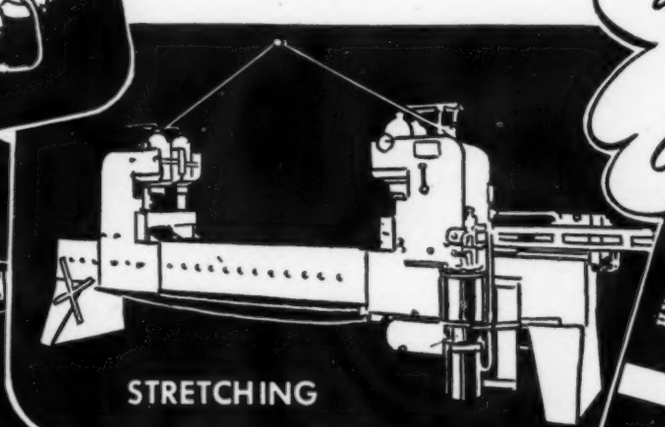
FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

Name the JOB!

There's a KRW PRESS that can do it BETTER... for LESS

● **Illustrated here are four KRW Hydraulic Press adaptations that are typical of many being built by KRW today. All are priced from 30 to 200% less than competitive makes of comparable tonnages or capacities. All are motor-driven and incorporate the time and production proven features that have made the standard KRW Hydraulic Arbor Presses...** ***the most widely used press of their type in America.*** **Take the KRW Sliding Head Straightening Press as an example. This type KRW Press has been effecting tremendous labor savings in fabricating plants where plate must be "trued up" before it is processed or fabricated. The heavy, hand method formerly used was archaic and very costly by comparison. The same story holds true of KRW Stretcher-Levellers, KRW Blanking and Forming Presses, KRW Compression Molding Presses, KRW Bending Presses and many others. To save your time and ours, tell us your problem in terms of what you want to accomplish. We'll give you an answer and furnish literature that is pertinent to your needs. Mail the coupon now.**





Write for the **NEW KRW** *Catalog.....*

K·R·WILSON

215 MAIN ST. . BUFFALO 3, N. Y.

K. R. Wilson, 215 Main Street, Buffalo 3, N. Y. 11

Please send your catalog. We are particularly interested in your

Bending Presses ☐ Compression Molding Press ☐

Straightening Press ☐ Stretcher-Leveller ☐ Forming and Blanking Press ☐

Firm Name .....

Address .....

City and Zone.....**State**.....

GET THE FACTS

ON *American's* UNIVERSAL BROACHING MACHINE

AMERICAN
TYPE-T
3-WAY
BROACHING
MACHINE
CIRCULAR
NUMBER 100
American 3-way vertical hydraulic broaching machines are general purpose machines adaptable to many different operations, including surface broaching as well as push down and pull down internal operations. Easily operated, highly productive, and flexible in its applications. Sizes range from 4 to 8 tons with 24" stroke and 6 to 15 tons with 36" stroke.
AMERICAN BROACH & MACHINE COMPANY
A DIVISION OF
SUNDSTRAND MACHINE TOOL COMPANY

A NEW CIRCULAR, just off the press, tells the story of *American's* highly flexible 3-way Broaching Machine. Shown in detail are the various kinds of work it performs, including surface broaching, and push down or pull down internal broaching. *American* 3-way Vertical Hydraulic Broaching Machines combine the advantages of fast, easy operation with the ability to maintain a high rate of accurate production. A letter or post card will bring the new circular by return mail. Write today. Ask for Circular Number 100.

American
BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

This wheel costs

34% LESS

in Alcoa Aluminum

"Daytona" model racing car manufactured by Black Industries, Cleveland, Ohio.

And gives this model racing car better pickup, faster speed!

The makers of this small-scale racing car achieved full-scale savings in wheel cost and weight by making them of Alcoa 11S-T3 Screw Machine Rod . . . the stock made specially for your automatics.

Wheels of Alcoa 11S-T3 cost 34% less than free-cutting brass wheels, 17% less than cadmium-plated steel. And weigh only ⅓ as much . . . the car starts quicker, runs longer and faster.

Figure the cost of one of your screw machine parts in Alcoa 11S-T3 Aluminum. It's the free-cutting aluminum alloy that gives fine chips, cannot foul tools, means faster cutting speeds and less wear on machines. Has a bright finish, needs no painting or rust-proofing.

You can get prompt shipment of Alcoa 11S-T3 Screw Machine Stock from warehouses in 24 strategic cities. Sales offices in 54 cities. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh 19, Pennsylvania.

MORE PEOPLE WANT **MORE** ALUMINUM FOR **MORE** USES THAN EVER

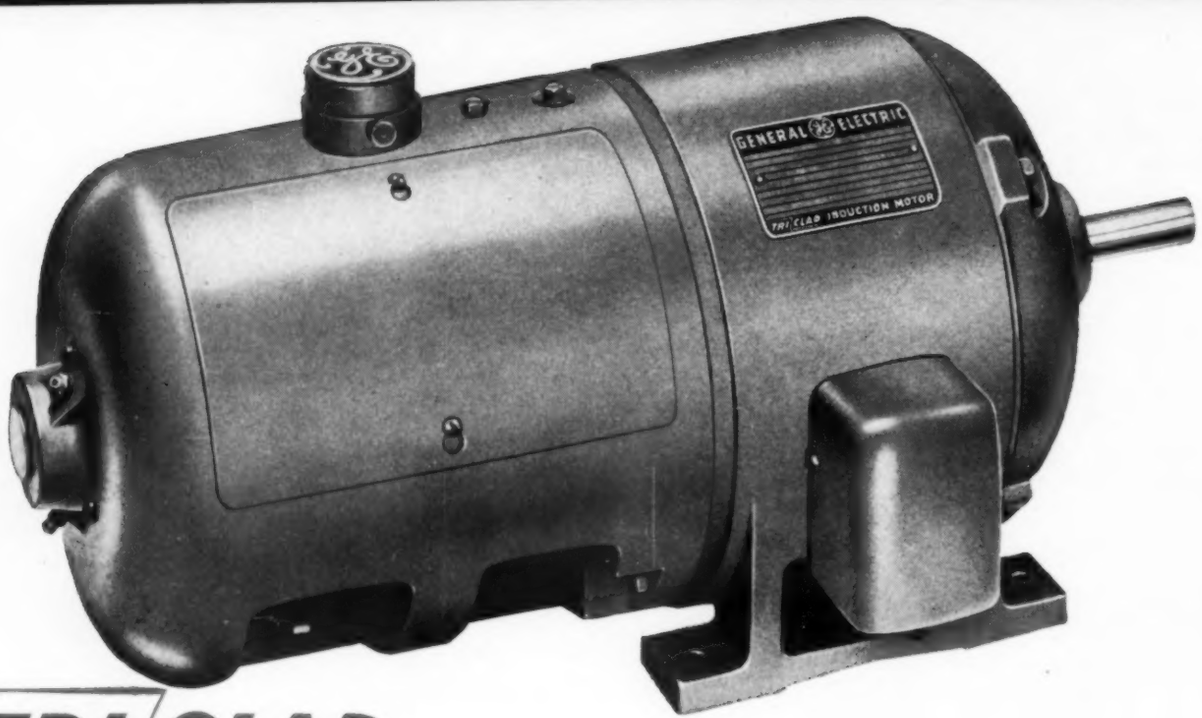
ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

now!

a simple a-c with 3 to 1 speed



TRI CLAD
REG. U.S. PAT. OFF.

Type ACA adjustable-speed induction motor

GENERAL ELECTRIC

motor range

HERE'S WHERE TO USE IT!

Textile
Slashers
Knitting machines
Individual finishing machines
Spinning frames
Printing machines

Chemical
Shakers
Grinders
Pulverizers
Mixers
Liquid pumps
Solids pumps

Metal-Working
Drawbenches
Lathes
Stamping presses
Milling machines
Grinders

Printing
Job presses
Coating machines
Trimming machines
Stitching machines
Rotary web presses

Food
Ovens
Proofers
Mixers
Fillers
Labelers
Grinders
Centrifugals
Conveyors
Shaker Screens
Pumps
Blanchers

Paper
Winders
Slitters
Supercalenders
Coating machines
Waxing machines
Embossers
Other converting machinery
Stock preparation machinery
Conveyors

Non-Ferrous & Rock Products
Mill feeder drives
Crusher feeder drives
Sinter conveyors
Other conveyors

Yes – you can now get a simple a-c motor and stepless speed adjustment over a 3 to 1 range *in a single, compact enclosure!* At the twist of a dial, the new Tri-Clad Type ACA induction motor changes speed quickly and accurately without *any power converting equipment.* Practically no different looking than any other induction motor, the Type ACA is a simple, economical way to equip old and new machines with an adjustable-speed drive and still retain the advantages of a-c motor operation.

Constant torque at any speed!

This new Tri-Clad motor provides constant torque over the entire 3 to 1 speed range and *holds* its speed despite load changes. Its efficiency and power factor are high at any speed – an important advantage where long operation over most of the speed range is customary. And for EXTRA PROTECTION against physical damage, electrical breakdown, and operating wear and tear, it features sturdy Tri-Clad design and construction.

Up to 50 hp available!

The Tri-Clad Type ACA induction motor with 3 to 1 speed adjustment is now available in ratings from 3 to 50 hp. Standard NEMA dimensions are used. For remote control, a flexible cable or pilot motor are available. Write today for Bulletin GEA-4883. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

You can't beat Tri-Clad Extra Protection!

GENERAL ELECTRIC COMPANY, Section B750-292
Apparatus Department, Schenectady 5, N. Y.

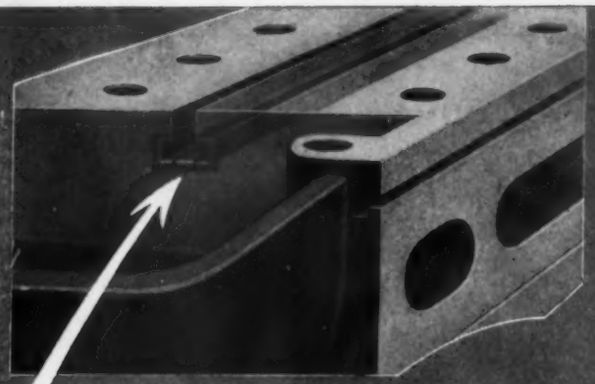
Please send me Bulletin GEA-4883 which describes the new Tri-Clad Type ACA motor:

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____



Examine your old Planer Tables and then realize the advantages of the patented HYPRO Steel Tee Slot Inserts

- Prevents damage to tee slots by bolt heads
- Prevents pulling out of tee slots
- Insures perfect condition of table thruout life of machine
- Facilitates removal of chips as they will slide freely on the smooth steel not requiring a special tool to remove them
- Can be renewed if necessary

Here's where the wear begins

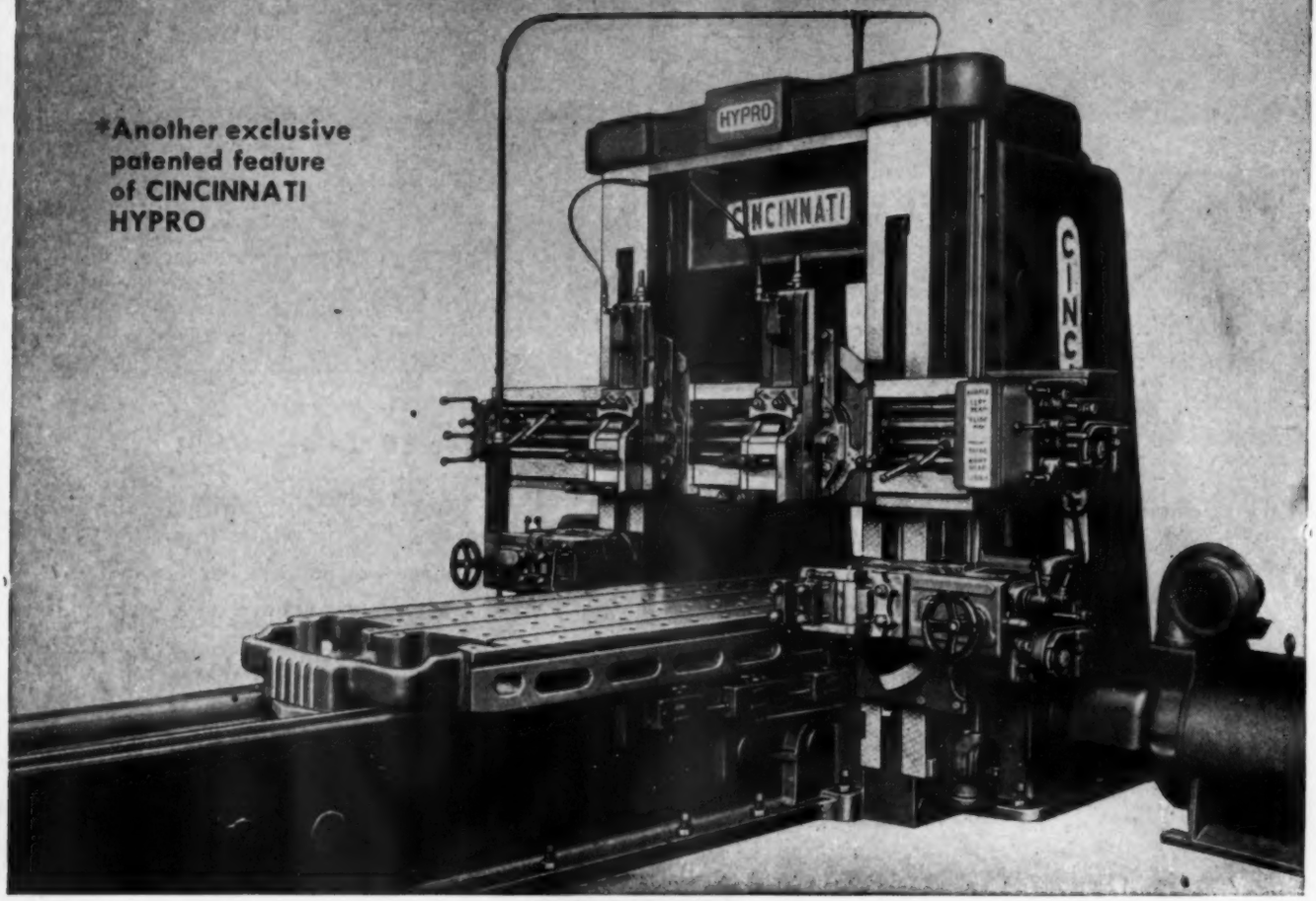
ON AN ORDINARY PLANER TABLE

. . . but not on a CINCINNATI HYPRO

BECAUSE IT IS EQUIPPED WITH

*STEEL TEE SLOT INSERTS

*Another exclusive patented feature of CINCINNATI HYPRO



THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

MODEL 30H MAN-AU-TROL HORIZONTAL LATHE PRODUCES 3 IDENTICAL PIECES IN LESS TIME THAN NORMALLY REQUIRED FOR ONE

Meeting demand for lower production costs on between-center shaft turning work which calls for turning, grooving, facing and angle-turning, this new BULLARD Man-Au-Trol machine offers advantages never before found in horizontal lathes.

3 Identically-Tooled Spindles Cut Unit Costs

Turning out three finished pieces per cycle . . . with simplified tooling for rough and finish cuts, with Man-Au-Trol keeping tools cutting almost continuously . . . the BULLARD Model 30H Lathe not only outproduces three ordinary horizontal lathes but also reduces tooling costs.

Makes the Operator's Job Easier

The BULLARD Man-Au-Trol Horizontal Lathe has headstock and all operating controls conveniently located at the operator's right. Each of the three hydraulically-operated chucks is controlled by a foot treadle . . . leaving the operator's both hands free. Work and tools are always visible and easily accessible to the operator without reaching across tools or tool slide.

An Automatic All-Purpose Machine

Man-Au-Trol, *the automatic control that is as versatile as manual control*, makes this highly productive lathe an all-purpose machine. Quickly and easily changed over from one job to an endless variety of other jobs and convertible from automatic to manual operation at the turn of a single lever, it is practical for long or short runs.

Write for Literature

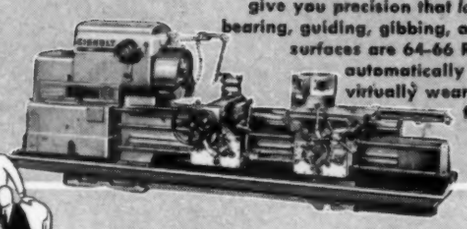
The unique combination of productivity, convenience, versatility and accuracy makes the new BULLARD Model 30H Man-Au-Trol Horizontal Lathe worth investigating. Complete specifications will be sent on request.

THE BULLARD COMPANY,
Bridgeport 2, Conn.

GISHOLT'S

Hardened steel bed ways are one of the greatest contributions ever made to precision machining on a turret lathe

GISHOLT TURRET LATH
give you precision that *lasts!* All lo
bearing, guiding, gibbing, and clamp
surfaces are 64-66 Rockwell C
automatically lubricated
virtually wear-proof. W
for literatu



GISHOLT MACHINE COMPANY, *Madison 3, Wisconsin*

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

turret lathes • automatic lathes • superfinishers • balancers • special machines

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

An optical comparator, developed by Westinghouse, compares the grain sizes of metal samples on a glass screen.

get ready with CONE for tomorrow

Westinghouse Lamp Div. is drawing tungsten wire as fine as .0018" a pound of which is 950 miles long.

be ready with CONE for today

The Hypermatic, a high-speed punch press made by Lempco Products, Inc. of Bedford, Ohio, is claimed to be vibrationless, even at top speed.

get ready with CONE for tomorrow

Union Pacific RR is experimenting with the adaptation of a 10,000 h.p. aircraft gas turbine to locomotive use.

be ready with CONE for today

Minneapolis-Honeywell Regulator Co. has an electronic compass for aircraft that has no moving parts and can be used as a magnetometer in prospecting.

get ready with CONE for tomorrow

In the attempt to push air speeds into the transonic range, Curtiss-Wright Corp. has developed a propeller with crescent-shaped, "swept-back" blades.

be ready with CONE for today

Brighter, cleaner and more durable shades of brown for enamels, paints, inks, plastics, etc. are forecast in duPont's announcement of its new pigment "Auric Brown."

get ready with CONE for tomorrow

The Type WAA Race Tester offered by Physicists Research Co. provides for both micro-inch measurement of surface waviness of inner and outer bearing races and control of production set-ups

Pharis Tire & Rubber Co. claims that its two-ply, glass fabric tire is stronger than four-ply rayon.

be ready with CONE for today

The new Crosley is said to be the first postwar car with an aluminum body.

get ready with CONE for tomorrow

American Welding and Mfg. Co., Warren, Ohio, is ready to road-test its application of torsional springing to railroad car trucks.

be ready with CONE for today

Lundberg-Ryan Air Explorations have ordered two Bell helicopters specially equipped for oil and ore exploration.

The National Electrical Manufacturers' Association is engaged in the standardization of small electric motors, such as those used in household equipment.

get ready with CONE for tomorrow

General Electric Co. has designed pallets of corrugated board which save shipping weight and can be thrown away after one use.

be ready with CONE for today

The top of an 85-foot, million-gallon tank at the U. S. Air Force Olmstead Airbase is being formed by spraying concrete over wire mesh.

get ready with CONE for tomorrow

Volumetric measurement of corrosive liquids to an accurate approaching laboratory precision is made possible by a new meter made by Browser Inc. of Fort Wayne.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

NOW

In the Multi-Single 4-Spindle Conomatic, you have one machine that will produce in volume, accurately and with quality finish, the production of 4 single spindle machines—*in the floor space of one.*

The 4 connecting links illustrated are produced from .437" S.A.E. 1113 in a cycle of 6 seconds, which effects a time of 1½ seconds each.

Ask your CONE *representative to show you our new color motion picture*

CONE

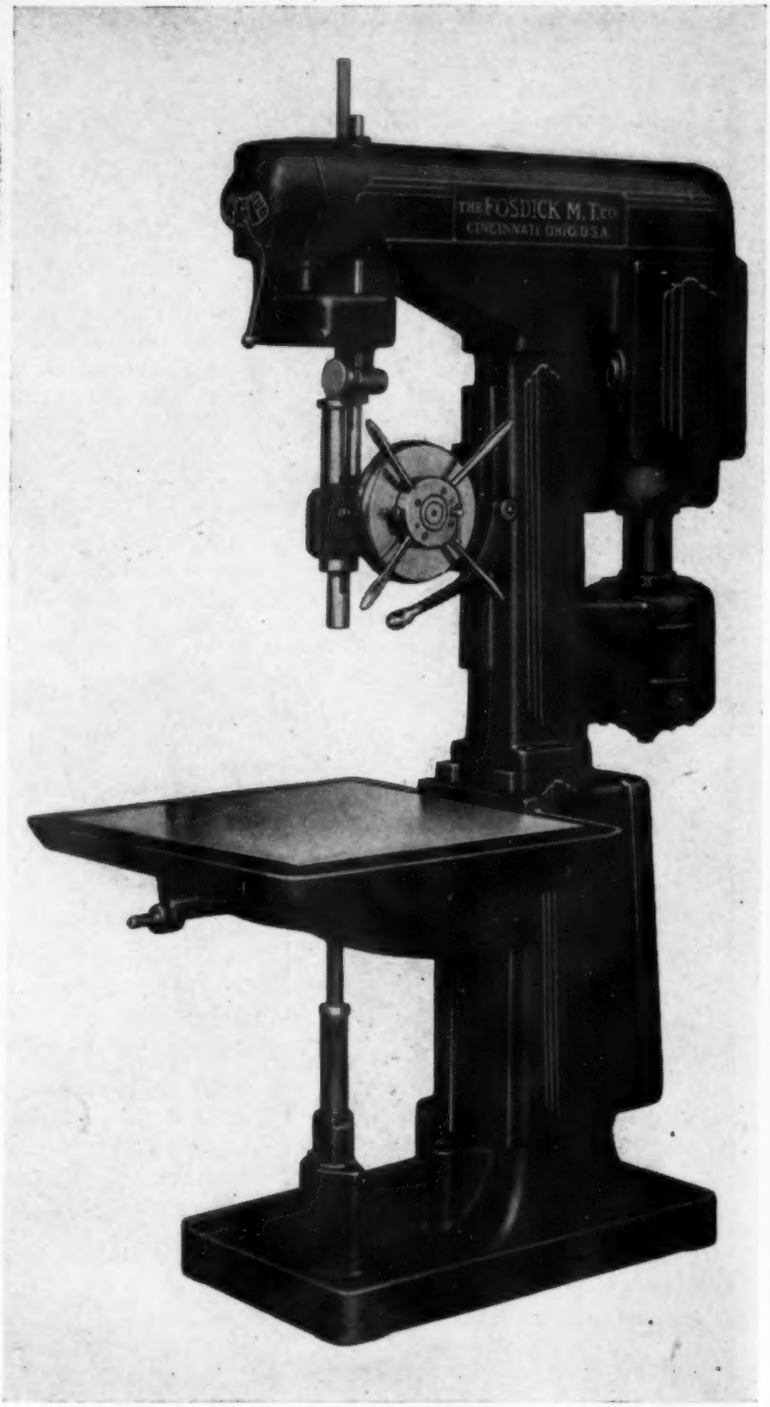
AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

45

FOR HIGH PRODUCTION OF SMALL DIAMETER HOLES

FOSDICK

4-BM and 5-BM SENSITIVE DRILLS



● Here is a machine ideally suited to drilling and tapping operations up to 1½" diameter holes.

Single speed motors with complete controls are furnished with the machine. To reverse spindle for tapping an extra contactor is added to the controller. Operation is simple—forward movement of the hand wheel causes spindle to run in proper direction and reversing hand wheel causes spindle to reverse.

The drive to spindle is through Vee belts. All revolving shafts are mounted on antifriction bearings and gears slide on splined shafts.

The machines are furnished with box or round columns and in any number of spindles up to six.

This line of Fosdick drills offers exceptional economy in drilling—reaming—facing and tapping operations on work within its capacity. Write for complete details—fully covered in Fosdick H. S. Bulletin H. S. A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

WHEN YOU WANT *More* TOOL LIFE

TRY BARBER-COLMAN CARBIDE TIPPED MILLING CUTTERS

This job was slow and costly because of low tool life and high cutter breakage. Three intermittent bosses on cast-iron brackets required the removal of ¼" stock. Hard spots and abrasive action of the material combined to shorten tool life by nicking and chipping the cutting edges.

After careful analysis of all factors, Barber-Colman Cutter Engineers recommended the use of carbide tipped shell end mills, with fewer teeth and slight-spiral gashes. Today, experience-tested B-C tip mountings and heat-treated high speed steel bodies are successfully withstanding the shock of the hard spots, and tool life and production are increased approximately 400%.

If your job conditions are suited to the use of carbides, consult a Barber-Colman representative on your next production problem. Experience the satisfaction that this manufacturer had in improving operation and increasing production.

Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

JOB FACTS

Operation — Face mill 3 bosses removing ¼" stock, center boss 2" x 1", end bosses 2" x 2½".

Material — Medium cast-iron.

Cutters — B-C Carbide Tipped Shell End Mills, 2¼" x 1½" x 1¼", slight spiral gashes.

	HSS Cutter	C-T Cutter
Feed	3"-4" per min.	15" per min.
Speed	40 S.F.M.	240 S.F.M.
Floor-to-floor	30-40 in 10 hrs.	90 in 10 hrs.
Tool Life	50 pcs. per sharpening.	200 pcs. per sharpening.

BARBER COLMAN

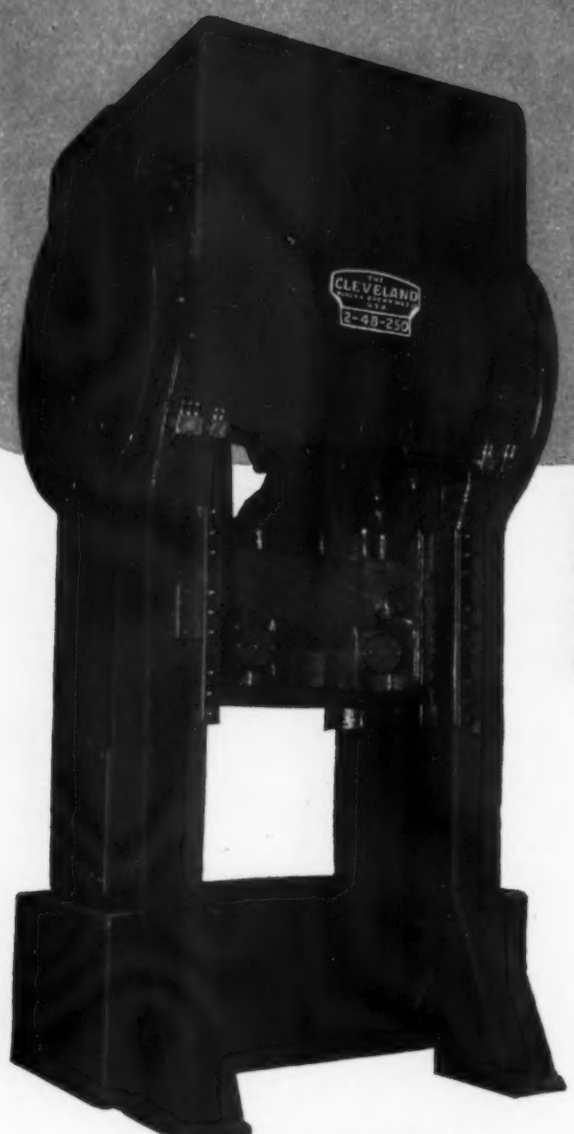
MODERN MACHINES DEMAND *Modern* CUTTING TOOLS

Cleveland

Modern

TWO POINT

PRESS



Cleveland Two Point Press, Capacity 250 tons, stroke 12", adjustment 6", shut height 30", bed area 36" x 48".

For the **PRESSING** Needs of '48

As each succeeding year witnesses a greater trend toward pressed metal products, and the more diversified use of Metal Stampings, the need for more efficient, more dependable and more modern Power Presses becomes apparent, and in "Forty-Eight", as in the past, Cleveland engineers will, by constant research based on past experience, anticipate the trend and be prepared to furnish Cleveland Presses capable of meeting each and every requirement.

Therefore, if you are interested in a particular Press to meet a particular problem, why not investigate the possibilities of more economical production through the use of Cleveland Presses —there are fourteen types and hundreds of standard sizes to select from.

The CLEVELAND PUNCH & SHEAR WORKS COMPANY

3917 ST. CLAIR AVENUE, CLEVELAND 14, OHIO

SPRINGFIELD

Geared Head LATHES

—are the result of more than 60 years of constant development based upon actual shop experience and are designed and built throughout to meet the exacting demands of modern manufacturing techniques.

No finer lathes exist today. Not only is there constant improvement in design and performance, but every detail of manufacture must conform to the highest precision standards. The gears of the Headstock are typical of these standards. Every gear is forged from the best grade of chrome—Molybdenum steel, heat-treated, and the teeth GROUND to close tolerances under the watchful guidance of experienced craftsmen to eliminate chatter, insure highest speeds and maximum performance.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

If you use gears . . .

The ADAMS Line

Spur Gears — Helical Gears
Bevel and Miter Gears
Worms and Worm Gears
Internal Gears (spur and helical)
Sprockets — Ratchets
Splined Shafts — Racks
Lead and Feed Screws
Ground Tooth Gears
(spur and helical)
Shaved Tooth Gears
(spur and helical)
Ground Thread Worms

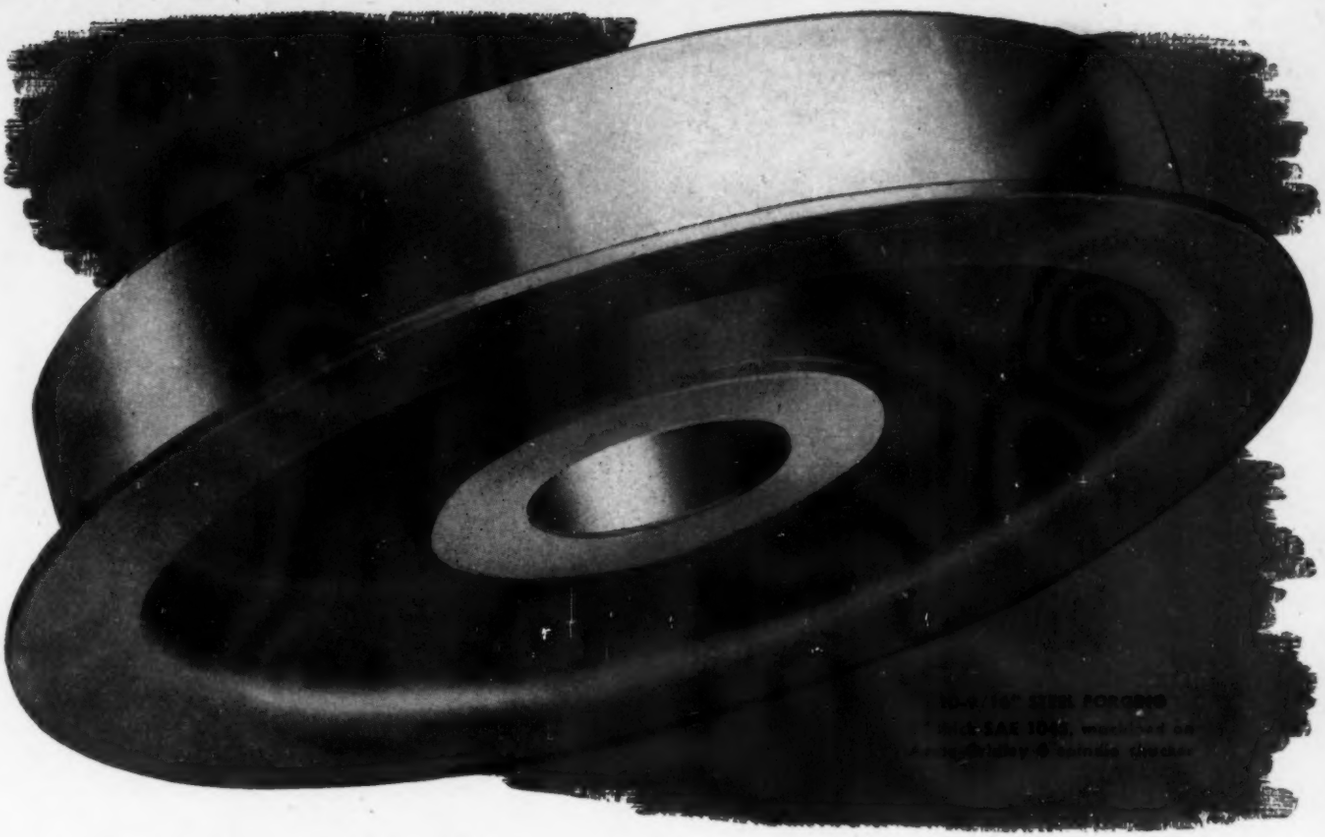
. . . you'll find it pays to use Adams custom-made gears that *exactly* fit your product's needs. Adams master craftsmen have long experience to guide them in producing gears which conform faithfully to your specifications. Rigid inspection at all stages of manufacture is just one part of our quality control which makes possible smoother operation, greater accuracy, and longer life. The most modern gear cutting machines are used, which, together with skilled craftsmen, is a combination that will simplify your gear problems.

For more detailed information write to: THE ADAMS COMPANY, 1942 Bridge Street, Dubuque, Iowa.

The ADAMS Compa
Dubuque, Iowa, U. S. A.

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS . . . . . ESTABLISHED 1883



45 SECONDS - MACHINED COMPLETE

IN 13 OPERATIONS, ON AN ACME-GRIDLEY 12" CHUCKING AUTOMATIC

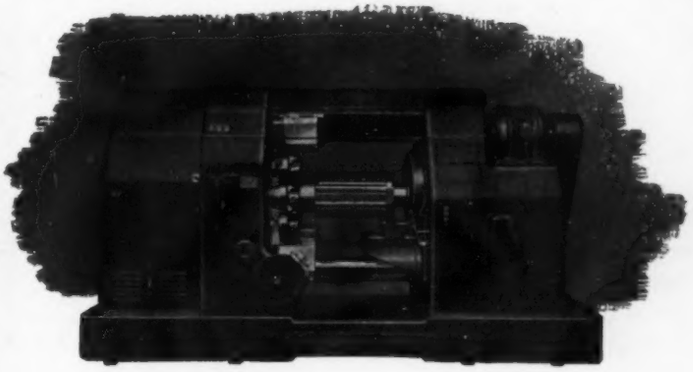
Heavy forgings finished at the rate of 80 an hour!

Where else could you get that kind of production except on a horizontal type automatic chucker—with its wide, open tooling zone and plenty of room for fast chip clearance?

The Acme-Gridley 12" RPA 6 spindle chucker offers all this, and more, too. It's built *rugged* (weight 36,000 lbs.)—for extra heavy cuts, fine accuracies and smooth finish. It's built for *easy operation*, too. To mention just one feature, the hydraulic loader holds heavy work under pressure while chucking.

And it's built for *speed;* makes wide use of independently-operated attachments. It will hog off chips as fast as modern carbide-tipped tools can take it. Simple, positive camming with quick job change-overs are additional operating economies to consider.

Can you use that kind of chucker performance?



ASK FOR BOOK "How Money was Saved on 25 Chucking Jobs"—fully illustrated for sizes 10"—4 spindle, 8"—6 spindle and 6"—8 spindle Acme-Gridley Chuckers.

The NATIONAL ACME CO.

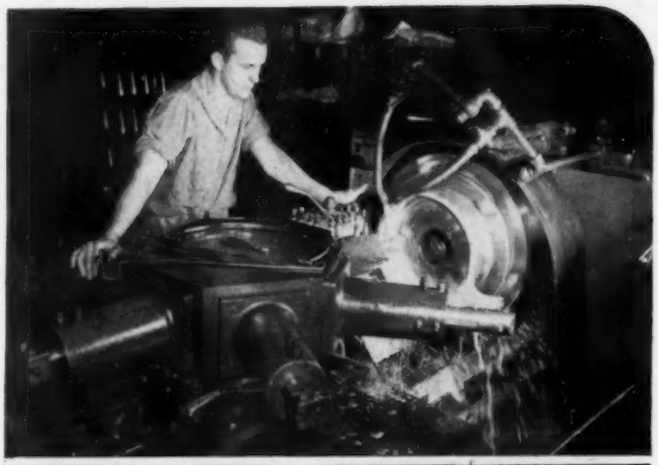
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

You can machine it

Better!

★ Precision is the keynote in production of centrifugal liquid separators at the Sharples Corporation, Philadelphia. That is why they use so many Warner & Swasey Turret Lathes. Their rigidity holds extreme accuracy and produces fine finishes on typical large chucking operations like the one shown here, where a Warner & Swasey 4-A equipped with cross sliding hex turret turns, bores and internal faces this stainless steel ring to tolerance of plus or minus .0005".



Faster!

★ The Gravely Motor Plow & Cultivator Co., Dunbar, W. Va., wanted fast production to meet accumulated demand for thousands of power-driven hand tractors and attachments. Production jumped 75% when new No. 2-A Warner & Swasey Turret Lathes took over the job of turning out cylinder blocks. Warner & Swasey's greater power safely delivers heavier cuts at higher speeds. Ease of handling decreases operator fatigue, permitting continuous top levels of output. High precision cuts down scrap loss. These all add up to faster production.

for Less!

★ This Warner & Swasey No. 2-A Turret Lathe has been used by the F. X. Hooper Company, Glenarm, Md., for over a decade without even the head cover being removed. Yet it still holds accuracy and is *efficiently* turning out all types of parts, such as a retaining washer, shown here, which calls for facing, drilling, boring and counterboring. This 10-year record of trouble-free, low-cost service is typical of the economies you may expect when you invest in new Warner & Swasey Turret Lathes.

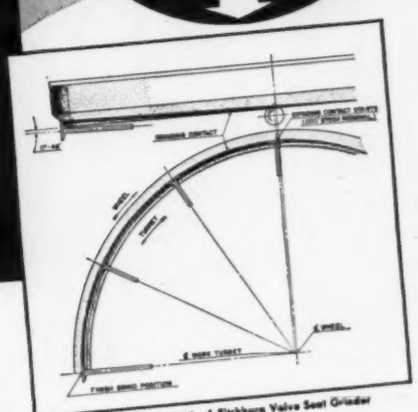
. . . . with a Warner & Swasey

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES. MULTIPLE & SINGLE SPINDLE AUTOMATICS. PRECISION TAPPING AND THREADING MACHINES

PRODUCTION IS 4 TO 10 TIMES GREATER on a FITCHBURG

CONSTA CONTAC GRINDER



SCHEMATIC DIAGRAM of Fitchburg Valve Seat Grinder

A BASICALLY NEW, MORE PROFITABLE METHOD FOR MASS-PRODUCTION CYLINDRICAL GRINDING

THE SIMPLE PRINCIPLE: Work pieces are automatically fed into 12 quill-type spindles on the periphery of a rotating turret. For one-quarter revolution of the turret, each rotating piece bears against the rotating wheel face. The pieces are automatically released on the downward arc and conveyed out of the machine. THE GRINDING PROCESS IS CONTINUOUS and the relative position of the turret and the wheel gives AUTOMATIC SELF-ADJUSTING FEED and AUTOMATIC SIZE CONTROL.

THE COST-CUTTING PRODUCTIVE RESULT: The FITCHBURG CONSTA-CONTAC Valve Seat Grinder shown above will grind the seats of automotive valves—from the rough forging to the finished size—without any necessity to deburr—*at the rate of 2160 per hour*—a rate vastly greater than possible by any other present method.

The inherent speed and economy of CONSTA-CONTAC GRINDING is best utilized in comparatively large-scale production. Present capacity is any part that can be chucked that is not greater than 3" dia. x 7" long.

Your inquiry for further information about CONSTA-CONTAC GRINDING—and a possible application of this new profitable grinding principle to your products—is invited.

Features:

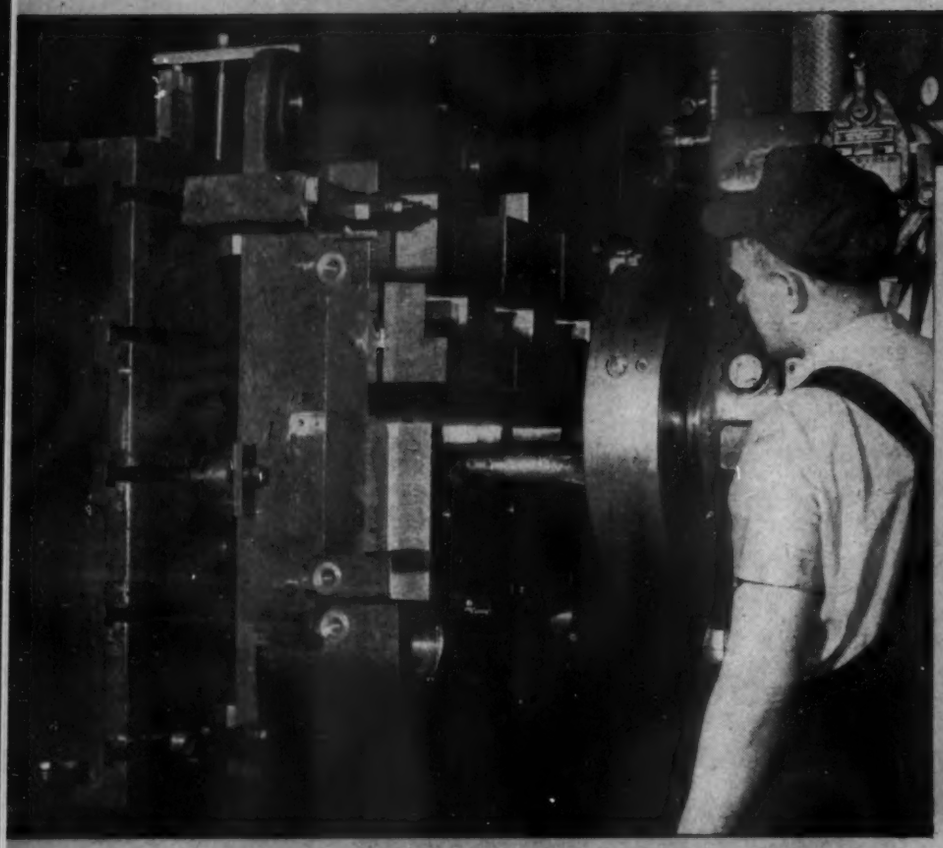
- ★ No "grinding air" time loss—3 or more parts are always "sparking" (the greater the stock removal, the more parts are "sparking".)
- ★ Automatic Size Control.
- ★ Actual sparking time is the same as that of other present methods—*but* CONSTA-CONTAC grinds 3 or more pieces in the sparking time required by one piece.
- ★ Work can be chucked or held on short centers.
- ★ Wheel can have both coarse and fine cutting surfaces—to rough- and finish-grind in one pass.
- ★ Wheel can be formed to grind several diameters and shoulders—exactly as in present-day formed-wheel grinding.

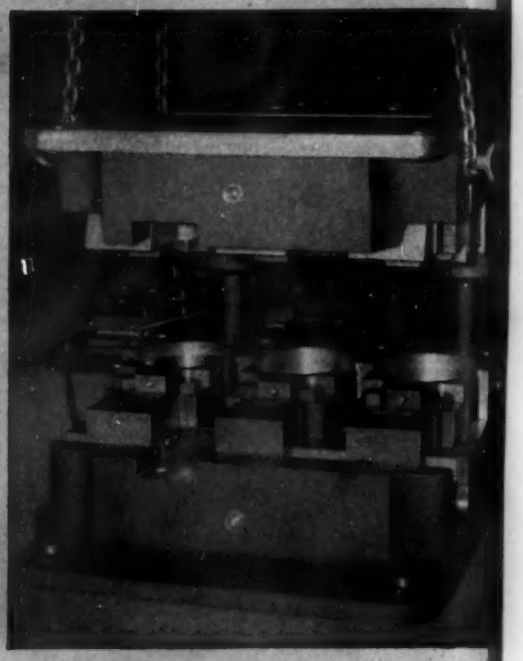
FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Bo-gage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders.

Now Danly Special Die Sets





with any additional machining required

New equipment installed in the Danly shop permits us to do any machine work on large or complex die sets incidental to the mounting of the dies. Inserts, recesses, additional boring, keyways and other machining can be done to the customer's specifications.

Time is saved by this service as work on dies and on the die set can be done at the same time. It permits the die shop or tool room to devote their equipment and man hours to the making of dies. The problem of the handling of big sets, for which the die shop or tool room are not generally equipped to do economically, is also solved by this service.

These special die sets are then delivered ready for the mounting of the dies. Note the size and complexity of the die set shown on this page. This die set—machined at Danly—is an example of the additional machining and service which this company offers.

On your next special die set inquiry include the additional machining work that you wish done at Danly while the die set is being made. The cost of this machining will be shown as a separate item in the quotation.

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DANLY *Special* DIE SETS

MACHINED TO YOUR SPECIFICATIONS

Spot American Machinist's NEWS OF METALWORKING

Front-engine motor cars will still be made and sold 10 years from now, predicts a high automotive executive. There will be rear-engine cars, but most of the cars built will have the power plant where it is today.

Ford would like to get away from concentration of so much work at Rouge and spread into other communities. Satisfaction with operating conditions at Canton, Ohio, where new forge plant is being located, is leading Ford executives to think in terms of more small plants in small cities.

Major unions not complying with requirements of Taft-Hartley Law and thus not able to use NLRB machinery are: CIO's steel, electrical, farm equipment, smelter, maritime, longshoremen, transport, furniture, food, office workers, packinghouse and communications workers unions; AFL's printers' union; and John L. Lewis' United Mine Workers.

B. M. Heede, New York City, is member of six-man commission appointed by Iranian government to develop a five-year plan for expansion of Iran's small arms factories and for manufacture of commercial products. Arms plants would supply 40% of Iranian army's needs, remainder of output going to neighboring states, possibly Arab states.

> **Bulk of organized labor is against a third party. CIO-PAC will back Truman. So will railroad workers. AFL will lean toward him if it does not officially endorse him. What little support Wallace gets will come from left-wing CIO unions: electrical, smelter, fur, farm equipment, longshoremen and food workers. Left-right tug-of-war within unions will flare up during 1948, may mean trouble in some plants, especially those having CIO-Electrical Workers.**

About 100 surplus war plants and facilities have been sold by WAA in past six months. Up to Dec. 1, plants valued originally at $2,369,116,000 have been sold for $1,012,863,000. That is a 43% return on the government's investment.

Refusal of NLRB to grant an employer's request for a plant election does not decertify a union which has a certification less than one year old. NLRB so ruled against J. Freezer & Son, Inc., which sought decertification of a non-complying union which had been certified only two days before the new law became effective. Certification is good for a year, but union cannot bring charges against company.

Voluntary allocation system set up by Congress is starting out to be more of a junior WPB than a junior NRA. H. B. McCoy, head of Office of Domestic Commerce, directs a staff to be expanded to 150 people, complete with unsalaried business executives, who will do for a few choke points in industry the sort of scheduling and materials-control done by WPB. Trouble is new group has no power of enforcement. (For detailed story, see pages 125-127.)

Russia has completed a seamless tube-rolling mill at Nikopol in the Ukraine. This mill, producer of large diameter pipe, is said to be the largest in Europe.

A process for making an all-welded automobile chassis frame is being developed by one of the leading motor car manufacturers.

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Wheels stay clean with *Texaco Soluble Oil D*

MAKE your grinding emulsions with *Texaco Soluble Oil D* (in hard water areas — *Texaco Soluble Oil HW*) and grinding dirt will settle out quickly . . . wheels will stay free-cutting longer . . . finish will be rust-free and smoother.

Texaco Soluble Oil D is made especially for grinding. It forms a remarkably stable emulsion that keeps the work cool and prevents distortion from frictional heat. Operators everywhere find it helps them grind more pieces per wheel dressing . . . and lengthens the life of wheels.

Let a Texaco Lubrication Engineer help you increase the efficiency of all your machining work. Just call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write:

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Depreciation: 1948 Model

The high cost of living is today's most popular, or unpopular, topic of conversation.

All of us know what a small basket of food a five-dollar bill buys. And have you asked lately the delivered price of a Ford or Buick?

If you want a new radio, you must have in your pocket far more than the cost of your old set.

How many metalworking manufacturers bear in mind these simple facts in setting their depreciation policies on plant equipment?

They, as a group, are like men living in the past. If their depreciation rates are a criterion, they expect to buy production machinery at 1939 prices, an impossible thing to do in today's market.

They are writing off a $10,000 machine in their factory as though they could replace it with a similar machine of new design for the same amount of money. Yet it is obvious that the new machine costs $15,000.

If this were merely an academic problem, it might not be important. It is wrapped up, however, with the supply of capital itself. And an adequate supply of capital is industry's lifeblood.

"Depreciation" is not just a name invented to keep accountants busy. The term might well be abandoned in favor of the name "capital recovery allowance," as suggested by Frederick S. Blackall, jr. For that is what it really is.

The alarming fact is that most metalworking managements are under-depreciating their prewar plant equipment assets. They are operating programs which, in effect, tend to dissipate a considerable part of their original real capital.

If this policy should persist over a long period, industry will have failed to set aside adequate funds for capital equipment purchases. It will not be able to keep up with technological advances at a satisfactory rate.

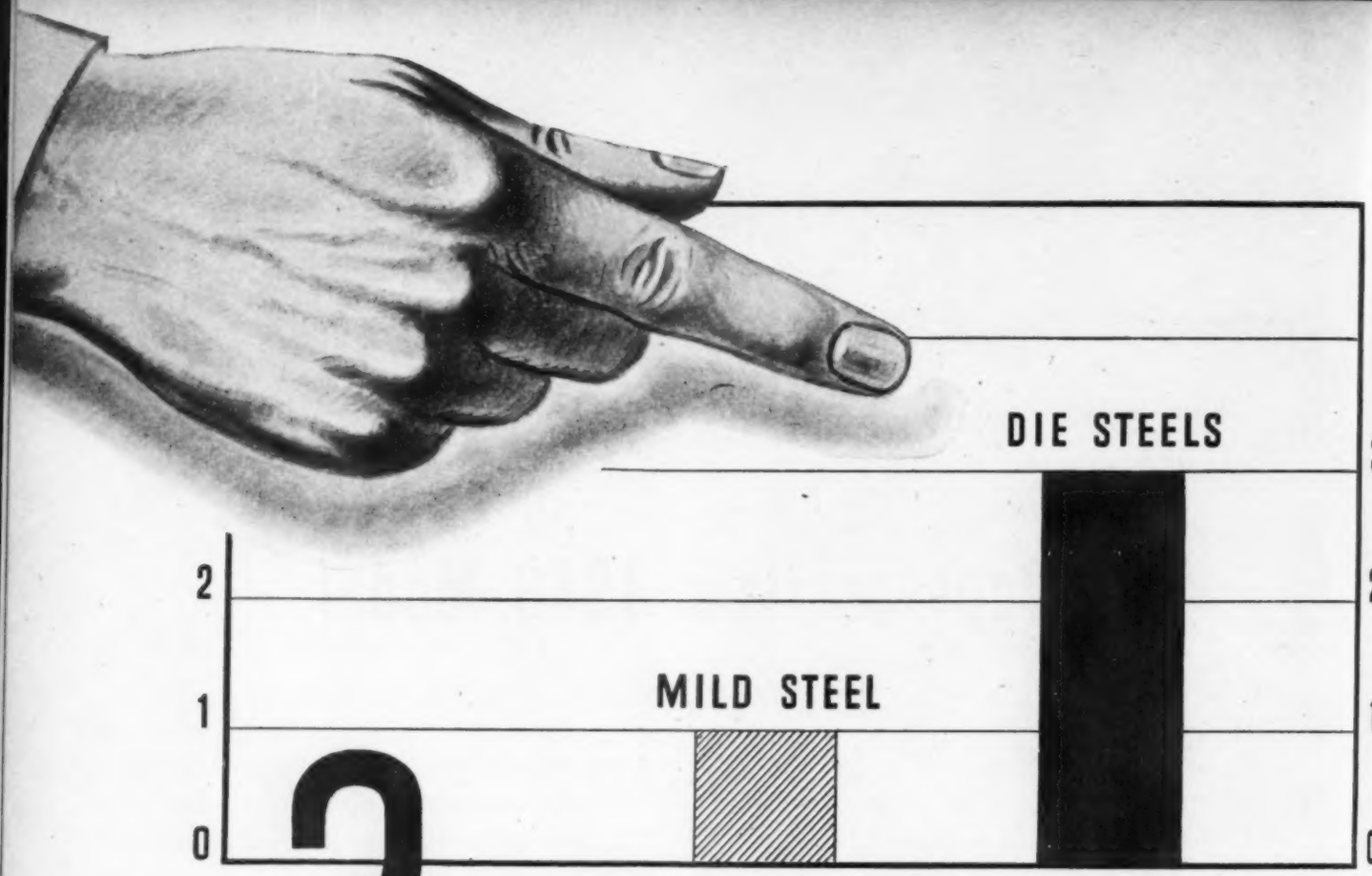
"A larger depreciation allowance on prewar assets," points out George Terborgh of the Machinery & Allied Products Institute, "would increase the volume of funds for renovation and expansion of the nation's productive facilities."

General Motors admits the truth of this statement. It has revised its program of late to liberalize its depreciation allowances. It has added over seven million dollars to its depreciation fund for the first nine months of 1947.

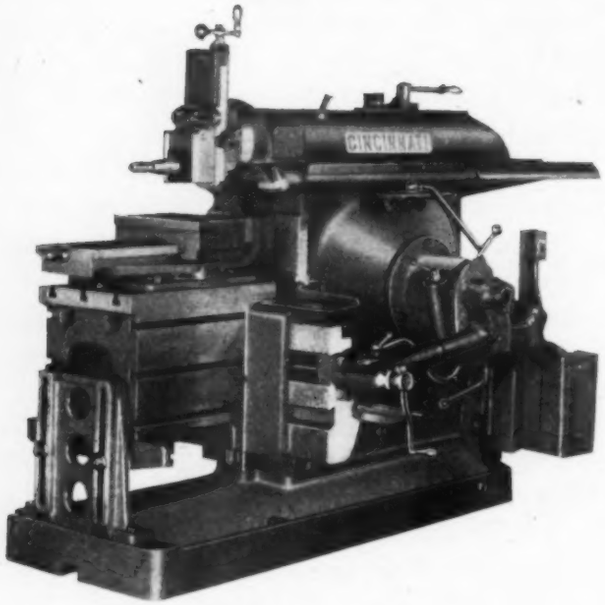
Other manufacturers should be as realistic as General Motors. They should recognize that depreciation is more than the word itself suggests. It is a capital recovery allowance and should be treated as such.

Burnham Finney

EDITOR



3 TIMES AS *TOUGH*..



Tool and die steels, often three times tougher than mild steel, put all machine tools to a severe test.

Only the exceptional Shaper—unusually powerful, rigid and accurate—will successfully work tool and die steels.

Cincinnati Shapers are found everywhere in tool and die shops where the job is always tough, and stamina and accuracy pay dividends.

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SHAPERS · SHEARS · BRAKES

Are You in Sleepy Hollow?

Rip Van Winkle, legend has it, slept there for 20 years. The Hollow can become a dormitory for Metalworking executives, too, drunk on their own ability

BY E. J. TANGERMAN MANAGING EDITOR

WASHINGTON IRVING first told of Rip Van Winkle, who partook too copiously of the dwarf bowlers' keg and slept for twenty years in Sleepy Hollow. He lost an old witch of a wife during his nap, but unlike the Sleeping Beauty and other snoozers of fable, he lost twenty years of his life as well. What's more, he was hopelessly out of date when he came back to familiar haunts.

Don't think that Rip existed only in fable. You can find him, without much searching, in almost every plant. He may not look like the accepted sketches of Rip—gaunt, bearded and gray—but his mind has those characteristics. You can spot him by his fanatical insistence on doing things the way his father did, regardless of modern concepts or developments. (There's a double-distilled variety, too, that thinks papa was modern—and sticks to grandpa or the founding fathers.)

Those present-day Rips are asleep at the switch, standing in the way of progress, unable or unwilling to realize that times and conditions change.

Start Checking High Up

To revive an old bromide, "Morale is not built from the bottom up; it filters from the top down." The same statement covers organization, efficiency and the other elements of a successful business. No organization — not even any department — can be better or brainier than the man who heads it. Therefore, the first place to look for the snoozers is on the board of directors. Are they all money men, lawyers and widows? Let's assume the president and executive vice president are members, but why not add the top production executive, sales executive and engineering executive? Then plant and production developments can be explained in more graphic terms than dollars, policies can be discussed from the point of view of the men who are responsible for making them work. An alert and aggressive board can do more than anything else to provide active management real support and understanding.

How About Yourself?

This is all splendid talk, say you, but what's to be done further? The initial steps are probably in self analysis. How wide awake are you? Are you as alert to new methods of feeding and caring for your industrial cow as you are to those for milking it? Are you disinterested, trusting, tolerant of inadequate workmanship, merely incensed at government and labor? Are your plant, equipment or men obsolescent? Are you waiting for costs to come down, for labor to become more productive, for the situation to stabilize?

You'll find some of your competitors are not—they're going ahead from day to day, using such indications as are available, building productivity by providing faster, more modern methods rather than by hoping labor will reform.

There are special feeds and ejectors to reduce the operator's labor while speeding the process, automatic gaging to reduce the human factor, materials-handling units to cut down work and travel time, transfer devices and multiple machines to cut the number and skill of needed hands. All these increase productivity.

There are incentives, modified labor laws and awakening awareness by individuals and whole unions. One executive finds it possible to offer an assembly gang incentives—and multiply production many times while other worker groups ask for similar treatment. Other executives talk to *labor* as *men*, with mutual understanding and appreciation. Others report to worker's families, take an interest in community affairs and show in other ways that management can be human and progressive. If you can't talk to working men without condescension, you'd better hire somebody who can to do it for you.

And Employee Relations?

Are you the victim of an outmoded system for employee relations? This (like advertising) is no longer the job for an indigent nephew or fill-in time for the sales manager's office boy. Is there a clearcut policy for keeping workers informed of your point of view? How about bulletin boards, company-sponsored affairs, employee manuals, annual reports, the plant magazine or newspaper?

Are You In Sleepy Hollow? CONTINUED

Are they doing a job that returns your investment in them — or are the methods of twenty years ago still good enough?

These jobs must be done by experts today — never underestimate the skill and ability of the men against whom they must compete, for the voices of organized labor are competent ones. For too long, shut-eye management has been content to believe that nobody believes the "hysterical rantings" of some labor media — and is now astonished to awake and find that among the believers is its own workmen. If you doubt it, check worker opinions of profit percentages, executive salaries and company nets.

Consider in particular your company house organ. Some are competent jobs, but the majority are so busy printing badly taken pictures of Joe and Goitrude, plus periodic gossip from departmental tattletales, that they can't hope to do an adequate job of presenting the company's attitude or its importance. Names do help make news, but they are not the essence of it — at least since vaudeville died. Your house organ, and your very opinions, today must compete for a hearing with means of reaching people that employ the best talent money can buy, and are delivered to the consumer either free or practically so.

Further, building employee relations through a house organ is *not* done by printing pictures of executives trying to act like ordinary people—it can be done by speaking honestly, frankly and sincerely to ordinary people. They may not always agree with your point of view, to be sure, but if they respect you they'll give your opinions a hearing. If you can't get that, it's time to change your policy — or save your money.

Now to Staffs

Which brings us to staffs. There's still a place for brains, human and mechanical, and for aggressiveness. But they must be channeled and balanced by human understanding and awareness of today's best ways of handling today's problems. Think about things like these:

Don't confuse ability and servility. The man who expects to attain his goal by polishing the apple with you always seems to have one foot ready to kick you as he passes up to polish the apple with the next man in line.

"There's still a place for brains . . ."

It's flattering to feel idolized, yessed and waited upon, but too frequently your "yes" man is a "no" man in the brains department. Forget any paternalism or personal feeling when you pick executives; find the man who knows what it's all about and whom the men admit knows it.

Don't make seniority—or just plain age—your criterion. Many men have had the good fortune to look older than they are, many the bad fortune to look younger. Wrinkles or a gray head have through the centuries been supposed to connote experience and wisdom—actually they connot neither. Study to find out what's inside —maybe the fellow who whistles and clowns is also the natural leader, his ebullience stemming from confidence in his knowledge and ability, his forwardness from his ideas. Many and many a man has gotten an undeserved reputation for sagacity just by keeping his mouth shut. He never risks his reputation, and his employer has the doubtful advantage of an executive who can be trusted to do what his grandfather (or the employer's grandfather) did in any given circumstance. The only trouble is that it's hard to read by candlelight, and a bit embarrassing to have no solution for a problem grandpa never faced.

Don't expect too much from heredity or environment. The son of a famous—or just competent—man may or may not be your answer. He's no more sure than your schoolmates, fraternity or lodge brothers, townspeople or blood relatives when the chips are down. You may like him very well, but you may be judging by conditions of 20 years ago—and may face a grim awakening. Don't close your mind to the nobody who has what it takes, the seemingly parentless idea that has possibilities, the method that deserves a trial. If you do, you're due for a trimming—and not just of a lengthy beard.

"Secret Processes"

We editors face, perhaps more frequently than production men, the "secret" process or processes. We may see, but not describe, dozens of special methods—for fear competitors of the source plant may see and profit. Competitors are, of course, rigidly excluded.

For the record, this attitude is silly —unless the development is the subject of patent application or to be announced almost immediately. Far more frequently than we can admit, we have seen a "secret" method already in use in competitors' plants—and improved upon. Furthermore, the speed with which a risqué joke covers the country is negligible be-

Tips FOR TOP SHOP MEN

215 Any searching for inefficiency in your organization must start with yourself. When you know your own weaknesses, you can provide personnel and methods to compensate for them—then begin digging out soft spots under you.

216 Are you able to talk, on a man-to-man basis with your men? Do they know you well enough to consider you a person rather than a position? Grievances between men are rare, they're really between "labor" and "management."

217 The average man likes incentives—the basis of production-cost economy. Surveys indicate four out of five men on bonus think the system fair in their own plants, half not on incentive want to be.

218 If your men don't know company net profit percentage on investment, see that they learn it. It was once only the owner's business—but from that guarded secret stemmed present misunderstandings.

219 The man who drives you frantic trying to make you understand his point of view is neither a dummy, a pest nor an oversensitive nuisance. He's more likely to be an extremely intelligent, highly cooperative worker if properly handled. That's up to you.

sides that with which a "secret" process gets to competitors. Men change jobs, legitimate and trusted visitors bring along "relatives" to see the plant, and so on. Only plants without ideas fear competition.

Our Own Examples

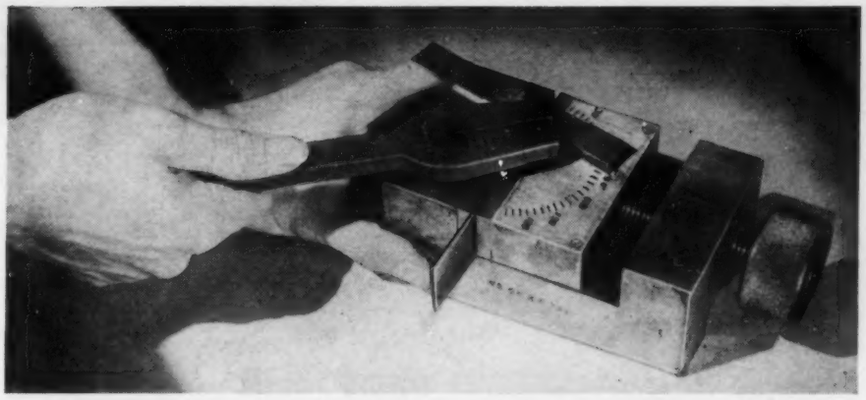
A company we'll call *A* refused us permission for publication of its methods for half a dozen years—to keep them from its major competitor, *B*. Then *B* held open house in its new plant—and *A*'s executives rushed home feverishly to prepare spec's for multi-million-dollar modernization to catch up. The open house made it obvious that *A*'s prices would be far above *B*'s new ones. Plant *A* has recently held an open house too—so Rip Van Winkle is belatedly getting a shave.

Then there was the blueprint which we wanted purely for reference in preparing a description of *C*'s new device. *C*'s public relations department denied its existence until competitor *D* said he'd lend us his photostat—then *C*'s engineering department produced the original. It had been top secret even at *C*—to keep *D* from knowing!

For ten thousand parallel examples, read the newspapers and their revelations about lost military secrets. We'll quote two cases: Our men heard of the German high-velocity 88-mm. gun from Spanish War observers, pooh-poohed it until they were on the wrong end in Africa. Now that the war is over, we have some lovely high-velocity guns of our own. The other example is the erroneous report the French had early in this century, of a versatile German 75-mm. gun. French ordnance men, no Rips, began feverish design—and produced the best fieldpiece of World War I. Is there any reason to believe your competitors may not have hired wide-awake descendants of those Frenchmen?

Maybe we'd better quote Manager *E* of a Canadian war plant. He said: "We have *no* production secrets—describe whatever you wish. If we can't surpass our present methods while others are copying them, we deserve anything that happens."

It stands to reason that no one plant has a monopoly on ingenuity, but the trait seems to grow only when it's used. "Secret" processes build false confidence and dull alertness. What's more, it's the man who announces his developments who gets the credit for being progressive, and draws progressive employees and customers.



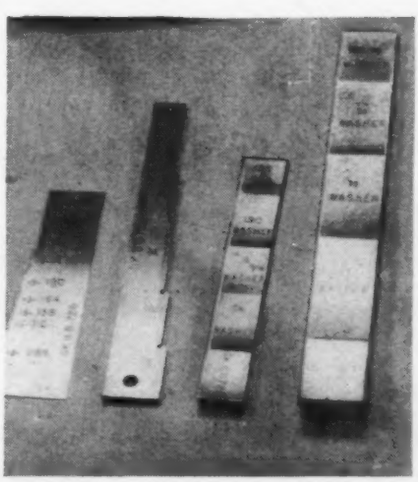
Built-in Protractor on the vise shows the angle of failure of the lockwasher

Special Tools Torsion-Test Lockwashers Correctly

BY H. GREENBERG
Metallurgical Laboratory Section, Westinghouse Electric Corporation

APPARATUS that gives correct and reproducible results superior to the SAE "vise and monkey wrench" method for torsion testing of lockwashers has been developed as a result of an epidemic of defective washers a few years ago. Westinghouse purchases a large number of spring lockwashers to a specification very similar to the SAE specifications. (1946 SAE Handbook, p. 693).

The SAE testing procedure leaves much to be desired so far as duplication of results is concerned. The variables are: (1) the percentage of washer not included between the jaws of the vise, (2) the exact angle through which the washer is twisted before fracturing, (3) the grip of the monkey wrench on the washer.



Step gages placed between the vise jaws establish correct free height of lockwasher while being twisted with special wrench shown in use at top

These variables have been a sore point when the manufacturer questions a rejection of lockwashers due to failure on the torsion test. We have eliminated these variables by the use of a specially designed vise with a built-in protractor, special wrenches, and two sets of gages.

These gages are calibrated for different sizes of lockwashers. One gage fits between the jaws of the vise so that the lockwasher can be placed on the appropriate step. The other gage is placed on the level corresponding to the diameter of the washer. This leaves the prescribed circumference of the washer free for twisting between vise and wrench. The angle at which failure occurs can be easily determined from the protractor scale on the vise.

The testing apparatus has been used for the last two years for the routine inspection of all lockwashers received in the East Pittsburgh Works. During this time, we have experienced no questioning by suppliers of the validity of our test and rejections have been accepted without argument. In addition, this equipment is used for the torsion-testing of lockwashers after electroplating to assure us that the washers have received the stress-relief treatment for hydrogen embrittlement which often accompanies plating.

Align Honing Eliminates Bearing Scraping

ALIGN HONING CRANKSHAFT BEARINGS on these Bliss presses eliminates the scraping operation, holds alignment within 0.001 in., and makes the fitting of bearings a production-line operation

Align honing bearings of Bliss presses on the production line with portable hones is new time-saving assembly trick

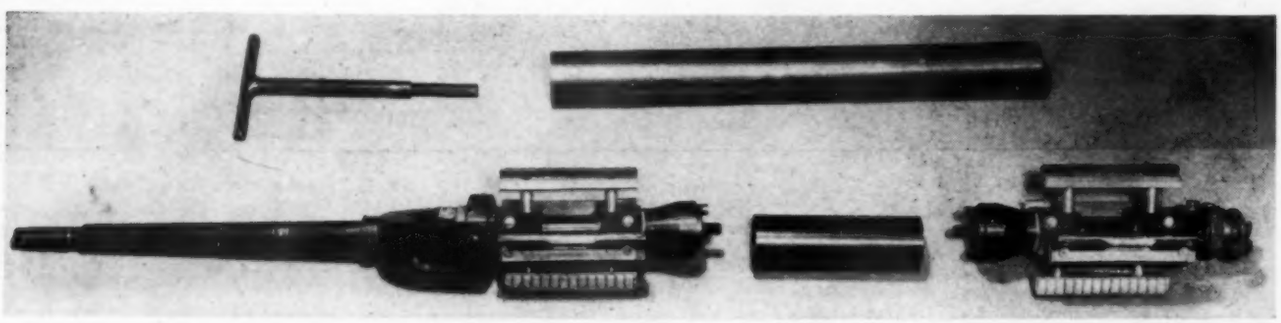
BY H. E. LINSLEY
ASSOCIATE EDITOR

FINISH-HONING of bearings is a generally accepted practice, but a recent development worked out by engineers of the Sunnen Products Co., St. Louis, in collaboration with E. W. Bliss Co., Brooklyn, N. Y., opens up an entirely new field and transfers finishing of the bearings from the assembly floor to the production line. Known as align honing, this process makes possible finish honing of two bearings in line to extremely close limits of size, roundness, taper and alignment.

The usual practice in most plants is to assemble the bearing shells and move the entire unit, which may weigh several tons, to a boring mill for finish boring to size. Work is then moved back to the assembly floor where a crankshaft or other shaft is placed in position with blued journals. Bearing caps are tightened down, the shaft rotated, caps removed, shafts lifted out, and high spots laboriously hand scraped. The entire process may be repeated several times before a satisfactory bearing is obtained, and much depends on the skill of the operator. Scraping, therefore, is a very common bottleneck, and it is not unusual for the entire assembly department to be held up by a balky bearing or a couple of slow operators.

In the Bliss plant, however, bearings are assembled and honed to size directly on the production line. First step is to check the rough bore with a dial gage to determine how much stock is to be removed from each side. This varies greatly with each bearing and may be as high as 0.030 in. on one side and only 0.002 in. on the other. The two honing heads, separated by a spacer shaft of the correct length, are then inserted into the holes and the driver gripped in the chuck of a pneumatic drill. A universal joint on the drive shaft eliminates the necessity for the operator to hold the drill in perfect alignment. As the hones rotate, the operator strokes the honing unit back and forth to traverse the stones over the entire bearing surface.

The bulk of the stock is removed with 60-grit stones, and finishing is done usually with 150-grit. Finer stones may be used if desired, and finishes of 5 microinches rms can be obtained if required. Roundness and straightness are checked with a dial gage and held to within 0.0003 in. on each individual hole. Alignment is checked by a long bar which, for a 4½-in. hole, is only 0.001 in. under nominal diameter. Final sizing for



EQUIPMENT for align honing consists of two honing heads with driving shaft for air or electric drill, adjusting wrench and one or more spacing bars for varying hole-center distances

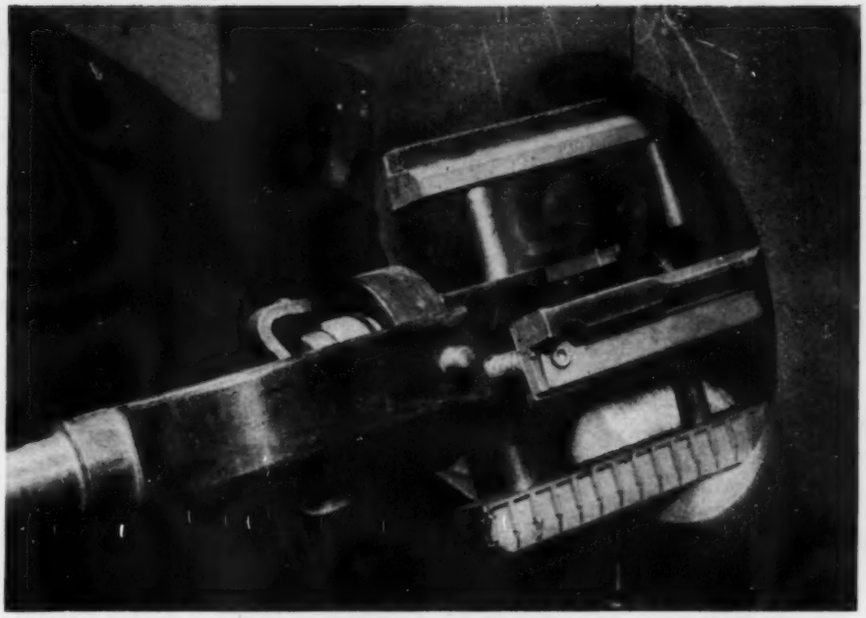
assembly clearances is done with a few additional strokes of the hone, using a dial gage to check final size. No hand scraping whatever is necessary, and there is no necessity for mating any one crankshaft to any particular press. The entire job, from rough bearing to finish size, takes only about 1 hr., which is approximately the time normally required for boring alone. All sleeve bearings on Bliss presses are bronze, but the process works equally well on any bearing metal except babbit.

As a result of the adoption of this process, finishing of bearings has been speeded up to a point where press frames are always ahead of assembly.

The secret of the whole process lies in the design of the honing heads. These are equipped with two stones and two guides. Positive adjustment of these stones eliminates tendencies of the hone to follow any untrue contour of the hole.

Each head is adjustable from 2 11/16-in. to 14½-in. dia., and end spacing is set by means of fixed-length spacer bars. One pair of heads is thus sufficient to meet all normal requirements. Honing is done dry on cast iron or bronze, using silicon-carbide stones. On steel, aluminum-oxide stones are used and honing oil or vegetable shortening is employed as a lubricant. The two honing heads have independent adjustment, but in the event one hole reaches size before the other, or if only one hole of a pair requires honing, the stones of one hone may be covered with a piece of canvas and used merely as a pilot. In normal operation both bearings are sized simultaneously.

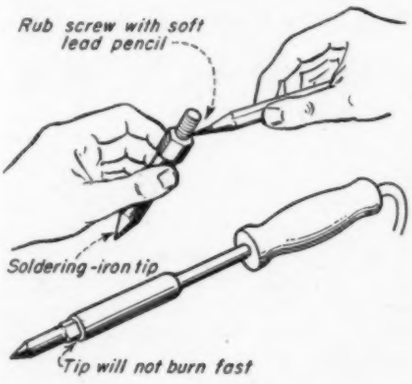
Align honing has eliminated several handlings of heavy press castings, the none-too-easy boring job and the long scraping operation in finishing bearings at E. W. Bliss.



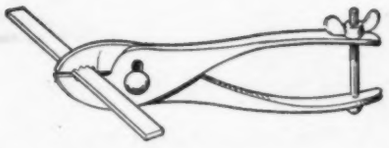
Close-up of one of the honing heads showing the stones and wipers. On the supporting pins of the lower stone can be seen the rack teeth by which adjustments are made *Photos Courtesy E. W. Bliss Co.*

Short Cuts FOR THE SMALL SHOP

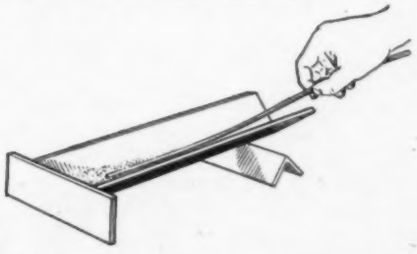
BY A. H. WAYCHOFF



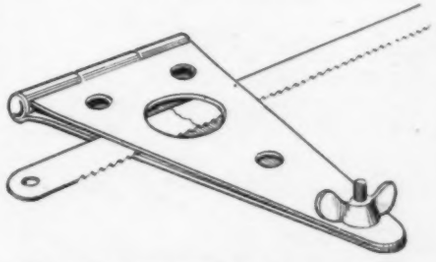
SOLDERING IRON TIPS will not stick in the holder if the threads are first rubbed with a soft lead pencil. The pencil lead is refined graphite which acts to prevent "burning in" of the threads from soldering heat. Thus, the tip can be removed easily.



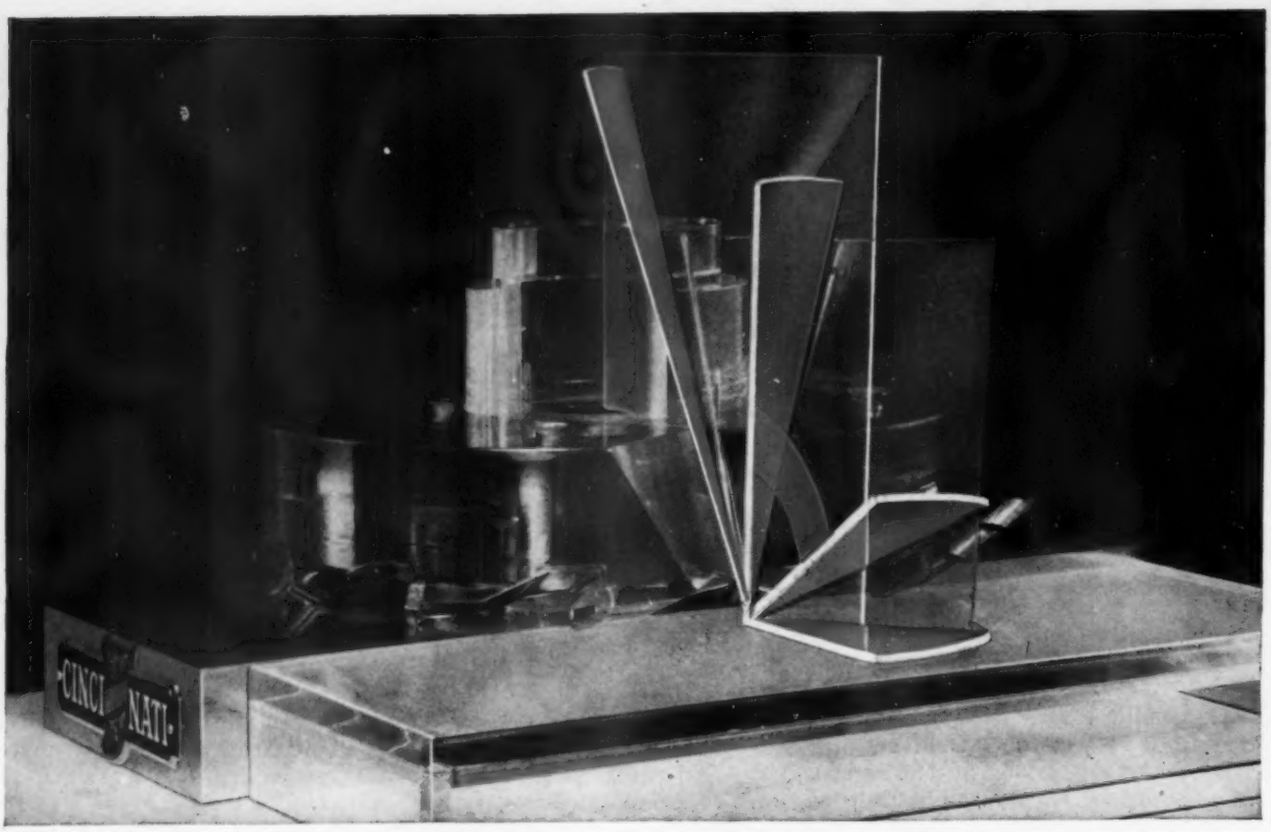
TO TAKE STRAIN off the hand while gripping work in pliers, drill holes in the handles and connect them with a machine screw and wing nut. A tighter, non-slipping grip on the work will be secured.



BRAZING CAN be carried on for longer periods if the wire is laid into a trough filled with flux instead of dipping it in a flux can. Make the trough from a piece of angle iron. Weld a strap on one end to close it; weld a foot under the other end to tilt the trough. By use of the trough several inches of the rod can be fluxed at a time.



BROKEN HACKSAWS can be repaired so that they will give a lot of further use. Cut a hole in one strap hinge, making the hole large enough so that the butted ends of the broken blade are exposed for welding or brazing. Drill a bolt hole through the tips of the hinge leaves.



***TOOL ANGLE MODEL**..This transparent plastic model visualizes tool angles which determine cutter performance*

Tool Angles Govern Cutting Efficiency

BY M. KRONENBERG, RESEARCH DEPT., THE CINCINNATI MILLING MACHINE CO.

Tool geometry is a vital production factor. Understanding is made easier by this model . . . True rake and inclination can also be determined from a chart presented with this article

DURING the past fifty years, progress in the design of machine tools has been stimulated at intervals by introduction of new tool materials: for example, high-speed steel at the turn of the century, and sintered carbides some 30 years later. The increase in tool life and higher speeds and feeds made possible by the newer tool materials called for stronger and more productive machine tools, thus obsoleting older designs.

Since the beginning of the last war, another upsurge has been initiated. This time, however, new developments are the result, mainly, of advances in tool geometry, particularly in milling, as witnessed by the development of negative-rake milling and the more-recent introduction of large corner angles and large positive angles of inclination on face-milling cutter teeth.

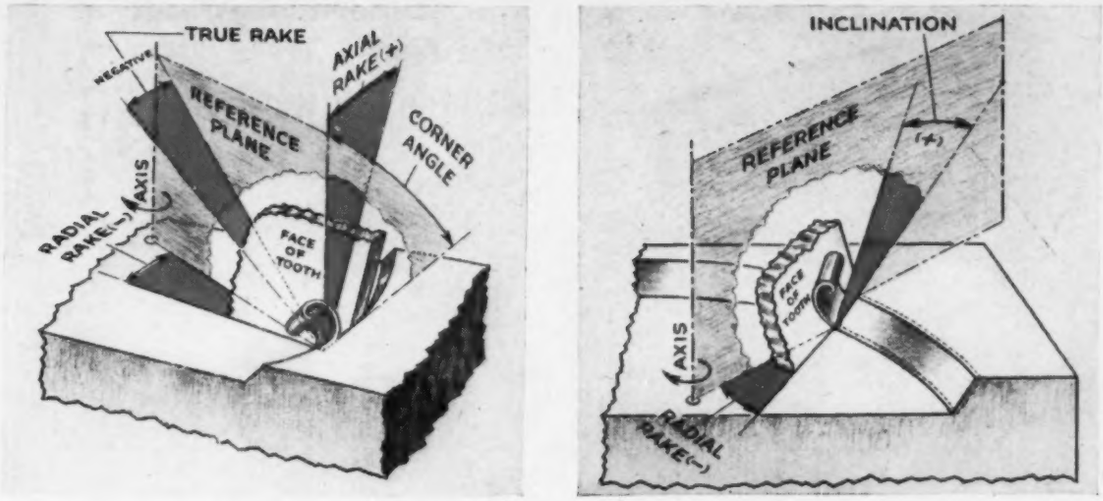
Increasing attention is consequently now being given to proper selection of tool angles as a means of improving production and for better utilization of the accuracy and metal-removal capacity of modern machines.

In view of the complex three-dimensional angular relationships involved in tool geometry, it is difficult to visualize the various tool angles which determine chip flow and cutter performance. A transparent plastic model of a typical face-milling cutter of modern design has therefore been prepared to facilitate demonstration and study of the problems involved.

Three different aspects of these problems are illustrated by this model: (1) angular relationships, (2) chip flow, (3) initial contact of tooth and workpiece. The workpiece on which the plastic cutter model is mounted was machined with the original cutter. This was stopped in the middle of the cut to leave partially formed chips.

Angular Relationships

The cutter axis is the natural reference line for milling-cutter geometry; hence a plane containing this axis is a natural reference plane for establishing angular relationships. Actually there are five principal angles on face-milling cutters which



***CALCULATIONS ILLUSTRATED** .. True rake calculations are illustrated in this left-hand view of the model, inclination calculations in the right-hand one. Both are charted on the next page for a face-milling cutter with 10° positive axial rake, 30° negative radial rake and 60° corner angle*

control cutting performance and chip flow: (1) axial rake, (2) radial rake, (3) true rake, (4) inclination, (5) corner angle. All are mathematically interrelated. These angles are indicated on the model by red segments with names embossed.

The transparent model makes it surprisingly clear that the first four angles lie between the "plane of tooth face" and the "reference plane," and that all are perpendicular to the reference plane. The plane of tooth face and the reference plane are shown by sheets of plastic material. This latter plane, by definition, contains the cutter axis and the point of the cutting edge.

While the first four angles are perpendicular to the reference plane, they lie in different directions: the radial rake plane lies in the machined surface; the axial rake plane is perpendicular to the machined surface; the inclination plane passes through the cutting edge and therefore intersects the reference plane in a line which is in fact the projection of the cutting edge; the true rake plane is normal to this line.

The corner angle, lying in the reference plane, is the angle included between the cutter axis and the projection of the cutting edge. It is necessary to measure and grind the corner angle in the reference plane—and not in the tooth face plane—because cutter axis and cutting edge are usually skew lines so no angle exists between them.

It is significant to note that with a tool geometry based on the cutter axis, the five princpial angles are related to the usual components of the cutting force and to the direction of cutting speed. The four red planes normal to the reference plane intersect each other in a single line passing through the point of the cutting edge in a direction tangential to cutter rotation (the instantaneous cutting speed direction) and consequently it is also parallel to the tangential component of the cutting force. The radial component of the cutting force lies in the direction of the reference plane—in which the corner angle is measured—because the reference plane passes through the cutter axis and the tool point.

(Only in the unusual case where the cutting edge is very long in comparison with the cutter radius is it necessary to consider additional reference planes for establishing angular relationships.)

An angle not shown on the model between the reference plane and the plane of tooth face is the "oblique rake." This differs from the true rake only in that it is measured in a plane normal to the tooth face; it is therefore oblique to the reference plane and to the instantaneous cutting-speed direction. Except for extreme values of inclination, its magnitude does not differ appreciably from that of the true rake; even for an inclination of as much as 30° (as in the cutter model), the difference is only about one degree.

Effect of Corner Angle

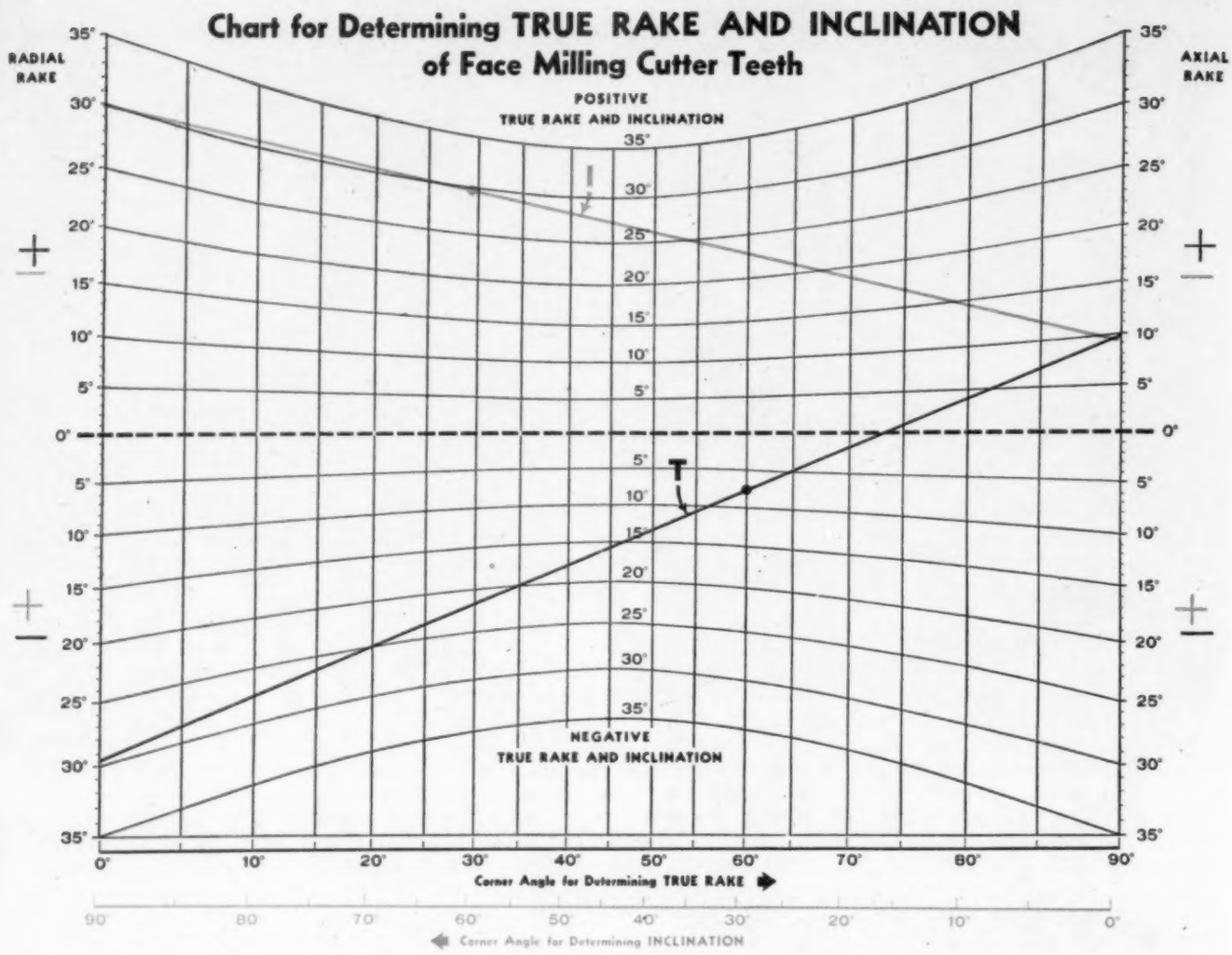
By the aid of the model it can easily be visualized that a change in corner angle affects magnitude and direction of both true rake and inclination. If the cutting edge on the model could be rotated upward (corresponding to the grinding of a smaller corner angle on the cutter), it would take with it the inclination and true rake planes, thus also changing the *magnitude* of inclination and true rake even though axial rake and radial rake remain unchanged. Hence, describing a face-milling cutter by the axial and radial rakes only is insufficient; the corner angle must also be given.

Determination of true rake and inclination for any combination of axial rake, radial rake and corner angle is facilitated by the chart here shown, prepared for use by the production engineers. Connecting the given values of axial and radial rake by two straight lines permits the reading of true rake and inclination for any corner angle. True rake and inclination are also illustrated by the two special drawings.

This chart applies to *lathe tools* also when the term "axial rake" is replaced by "back rake," the term "radial rake" by "side rake" and "corner angle" by "side cutting-edge angle." In the case of *peripheral milling cutters,* the corner angle is always zero; it will be seen from the chart that the true rake equals the radial rake, while the inclination equals the axial rake (often called helix angle on such cutters).

Mathematical formulas for these angular relationships have been published elsewhere.* (*Next p. please*).

* "Cutting Angle Relationships on Metal Cutting Tools," M. Kronenberg, *Mechanical Engineering,* Dec., 1943; "Inclination of the Cutting Edge and Its Relation to Chip Curling," *The Tool Engineer* March, 1945.



EXAMPLE: *Face-milling cutter with positive axial rake (+10°), neg. radial rake (−30°) and 60° corner angle.*

To determine true rake: Draw line T from +10° point on axial rake scale to black −30° point on radial rake scale. At its intersection with 60° vertical line from black corner angle scale read true rake (appr. −8°)

To determine inclination: Draw line I from +10° point on axial rake scale to red −30° point on radial rake scale. At its intersection with 60° vertical line from red corner angle scale read inclination (+30°).

Chip Flow

The inclination of the cutting edge is sometimes even more significant in tool performance than the true rake, because it allows—within limits—control of the direction of motion of the chip. A large positive inclination will cause a "helixing" of the chip *out* of the space between face mill and workpiece; this is shown on the model at several teeth where the chips are still attached to the workpiece. With a sufficiently large positive inclination, a helically formed, outwardly moving, chip is produced even when milling cast iron.

A negative inclination—where the point trails all other portions of the cutting edge—will cause a helixing of the chip *into* the space between face mill and workpiece, thus clogging it and marring the machined surface. A large positive angle of inclination is therefore vital to good cutting performance.

As indicated above, and on the chart, a large positive inclination is obtained by making the corner angle very large and the radial rake largely negative. Cutters designed on this principle have proved to be very effective, both on steel and cast iron.**

Initial Contact of Tooth and Workpiece

It can be shown mathematically*** that, with the combination of angles used on the model, the point on the tooth face that hits the work first is not located on the cutting edge but at an appreciable distance from the point.

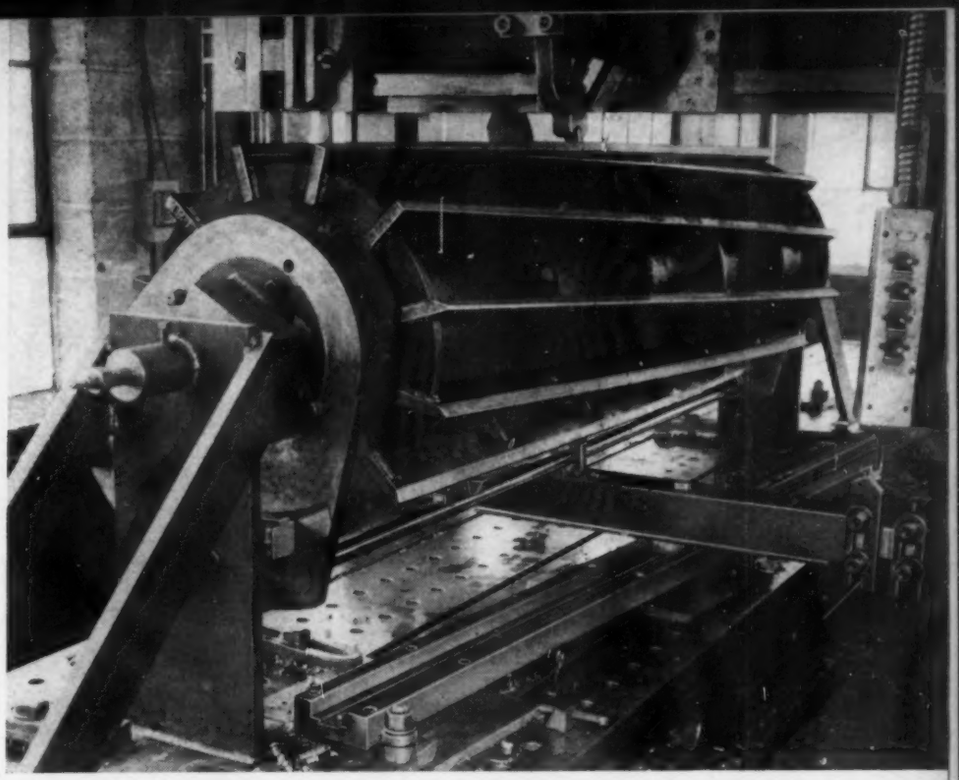
This is helpful in prolonging cutter life as the initial contact occurs at a point where the tooth is stronger than at the sharp point of the cutting edge. The location of the contact point is affected by the axial rake, radial rake, corner angle and also by the position of the cutter axis relative to the entry wall on the workpiece. When taking the cut illustrated in the model, the cutter was purposely offset from the centerline of the workpiece in order to obtain an entry angle favorable to cutter performance.

** "Milling Cast Iron with Carbides," M. Field and W. E. Bullock, *Mechanical Engineering*, October, 1945; "Speed and Feed Selection in Carbide Milling With Respect to Production, Cost, and Accuracy" H. Ernst and M. Field, *Transactions ASME*, April, 1946.

*** "Initial Contact of Milling Cutter and Workpiece," *Machinery*, Oct., 1945, pp. 149-155. "Analysis of Initial Contact of Milling Cutter and Work in Relation to Tool Life," M. Kronenberg, *Transactions ASME*, April, 1946.

Planer Makes Helical Cuts

BY GEORGE LALAK
Plant Mgr., Service Machine Co.
Elizabeth, N. J.



HELICAL CUT is generated by bronze block sliding in an angularly disposed channel and imparting a rotary movement to the work through the action of a fork engaging a guide bar as planer table reciprocates

IN THE manufacture of some large rotors, approximately 8 ft. long by 2 ft. dia., it was necessary to machine a profile on the edges of twelve blades welded to the outside in a 30° helix. One side required facing to a depth of 1 in., the opposite edge to be beveled 1 in. at 30°, and a ⅛-in. radius to be formed at the crest.

As no milling equipment was available for such a large job, it was decided to perform the work on a standard Liberty planer. A fixture was made up consisting of two welded angle brackets, carrying centers, and attached to the table. Attached to the rotor shaft are two indexing arms, each giving four index positions. These two arms are connected by three guide bars made from ground shafting to form a cradle. The guide bars are tied together at three places by brackets carrying three U sections into which the rotor blades fit. Setscrews passing through the side of the U serve to clamp the entire unit together, add rigidity to the bars, and eliminate vibration.

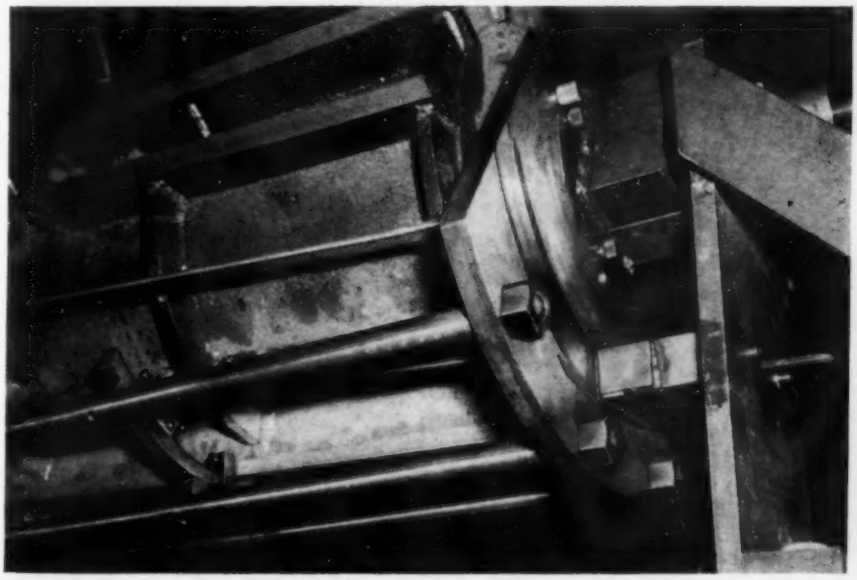
Attached to each bracket is a spring-loaded shoe faced with brake lining and bearing against the face of the index arms. This provides friction between the working parts of the unit, stops backlash, and dampens any vibration which might cause chatter in the cut.

Held between the side heads of the planer is a cross bar in which is mounted a bronze-faced fork which engages one of the guide bars. Attached to the lower end of the fork is a bronze block sliding in a channel clamped to the table at an angle to the direction of travel. As the table reciprocates, movement of the block in the channel produces a side motion of the fork, resulting in the desired partial rotation of the workpiece.

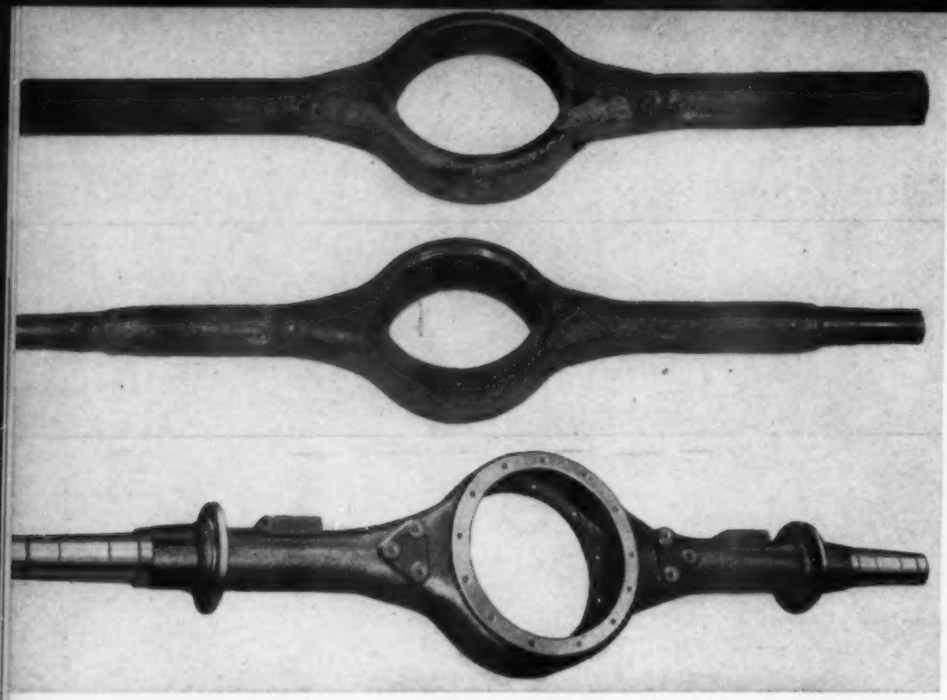
After the first blade has been machined, a hardened pin connecting the fork to the sliding block is removed and the fork shifted to the second guide bar. After each third blade the fork is returned to the first position and the index pin in the support arm is moved one hole.

The combination of three guide bars and four index positions gives the twelve positions for the blades. Cuts up to ¼-in. deep with a 0.005-in. feed have been made successfully on this rig.

Developed by Service Machine Co., Elizabeth, N. J., the fixture is not intended for production work, but serves well where only a few parts are to be made. Actually, this fixture does not generate a true helix because of the angularity between the position of the guide bars and that of the fork, but the error is extremely small and may be disregarded in the average run of work. In cases where this error is objectionable, a minor change in design can be made to overcome it by incorporating a rack and pinion in place of the guide bars and fork. Cost of machining the parts in this fixture is believed to be lower than by other methods.



BLADES are held by set screws in U sections attached to straps which tie guide bars together. Brake blocks bear on index plate to provide necessary friction



Rough housing with banjo hole rough bored (Top). Ends swaged, reinforcing rings welded, and rebored (Center). Finished housing (Bottom)

AUTOMATIC

Work-handling time is reduced

BY CHESTER S. RICKER

DETROIT EDITOR

PRODUCTION of Clark-designed, heavy-duty, 6-ton truck rear axles has been greatly speeded by a specially designed Cross "Transfermatic" for drilling, countersinking and tapping, and two new boring and facing machines.

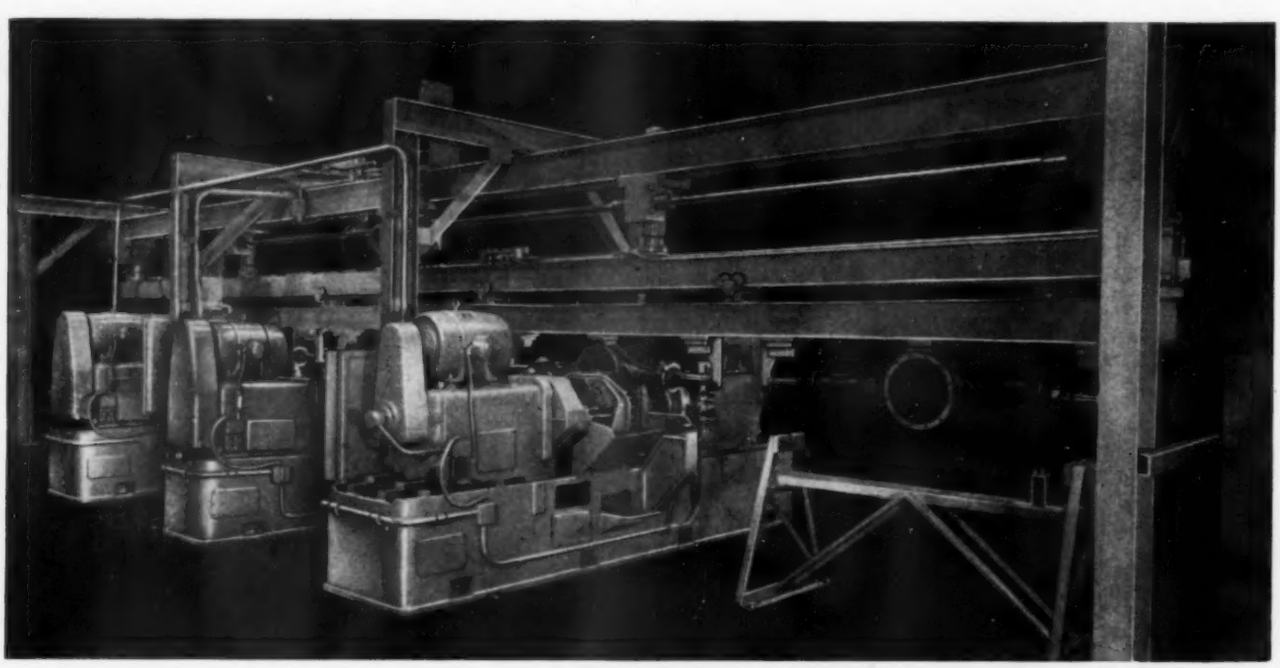
The axle housing is steel tubing, pierced at the center and formed in several operations to develop the banjo center.

First machining operation is to rough-bore front and rear banjo holes. Locating from these rough bores, reinforcement rings are welded to both banjo faces, then both ends of the tube are rough-formed. Next operation is to semifinish-bore banjo holes, exposing a groove between the reinforcement ring and the formed tube, which is filled by welding to secure the ring finally. End flanges and brake pads are next welded into place, followed by end machining. Finish-boring and facing the banjo section and final drilling and tapping operations are handled on special Cross machines.

For drilling, countersinking and tapping 12 holes in each of the banjo faces and three holes in each of the two brake pads, a specially designed Cross Transfer-matic is used. It features simplicity, flexibility, manpower savings and low original investment, and productivity on the heavy-duty housing line is said to be 60 pieces per hr. at 80% efficiency.

The Transfer-matic is a complete, automatic production line comprising a loading rack, a two - way drilling, a two-way countersinking, and a two-way tapping machine, an unloading rack, and an overhead transfer mechanism for simultaneously moving four pieces from machine to machine or station to station between operations. It is important to observe that all units in the line are separate and entirely independent, and without mechanical connection with one another. The countersinking machine burrs and chamfers both edges of the holes.

All Transfer-matic machines are conventional two-way machines,



General arrangement of Transfer-matic machine seen from finishing end of the line with overhead transfer ready to lower parts into individual machines and place finished axle on unloading rack

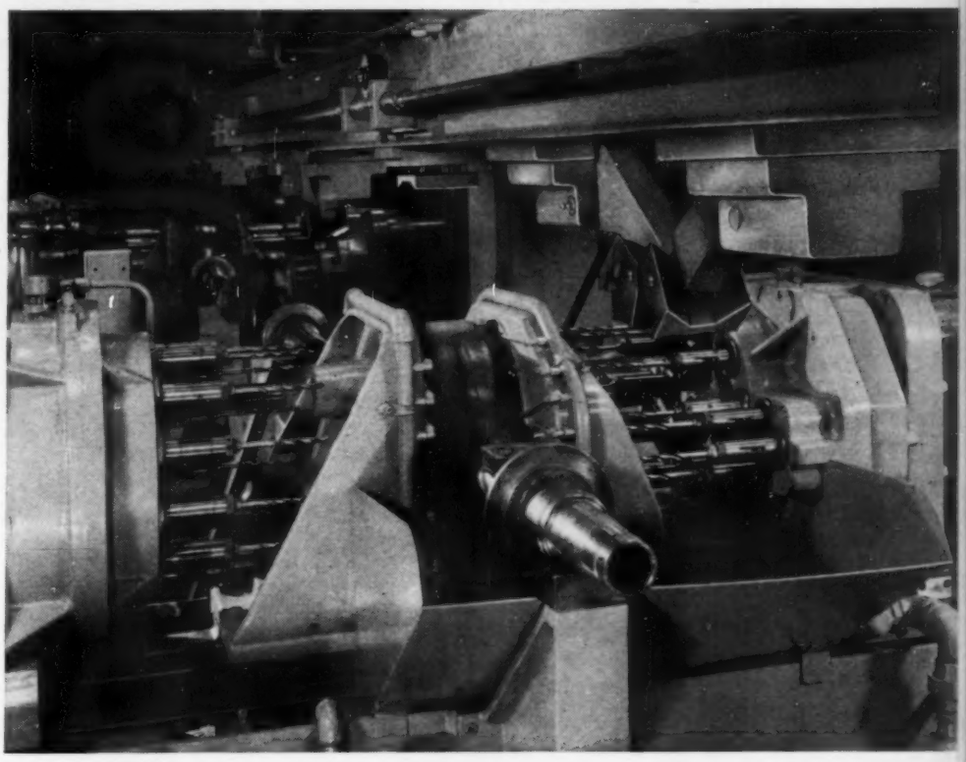
MACHINES SPEED TRUCK-AXLE PRODUCTION

to a minimum by new Cross Transfer-matic . . . Special boring and facing equipment cuts machining time

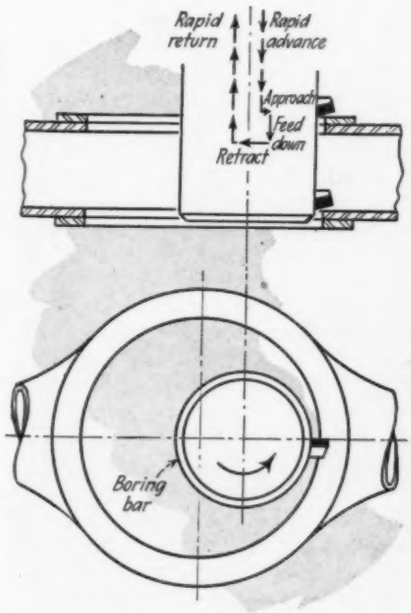
each with its own fixture, coolant system, electrical control panel and push button station for setup. Workpiece is clamped and released in each machine after each operation to prevent any accumulation of stresses which, when released, would distort the part. In each machine, fixture locates the part from the banjo face and from two ground diameters on the outer ends.

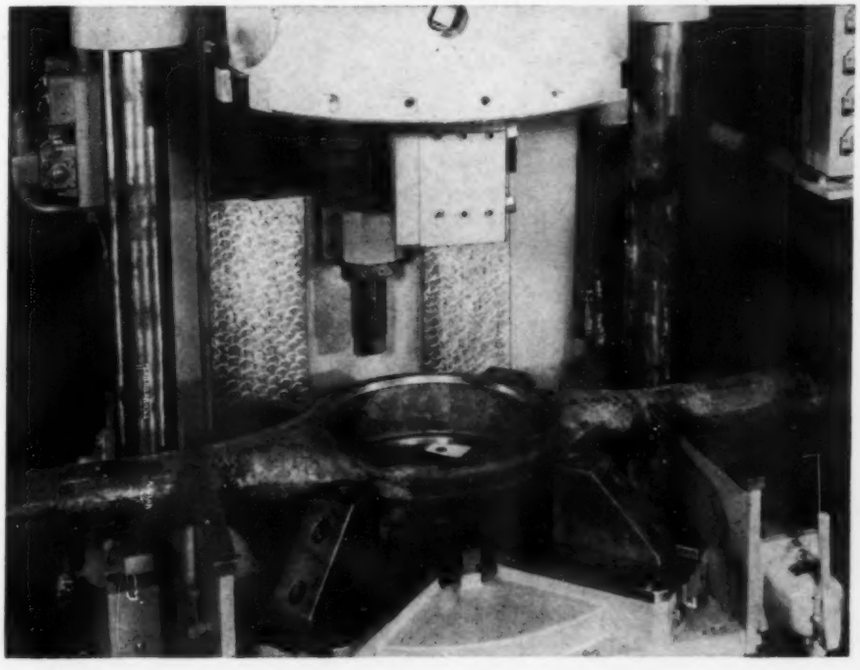
There are two multiple-spindle drill heads on the drilling and countersinking machines driven and fed by standard Cross No. 27 hydraulic way-type feed units; tapping machine has two identical multiple-spindle heads driven by a standard Cross No. 17 leadscrew feed unit. The latter is interesting because precision tapping is obtained with different size and pitch taps simultaneously. The transfer mechanism is unusually simple and foolproof in construction, and is suspended from a stationary, overhead I-beam.

Actual lifting of the carrier beam is accomplished by a series of racks and pinions actuated by a single hydraulic cylinder mounted on top of the stationary frame. Pinions are

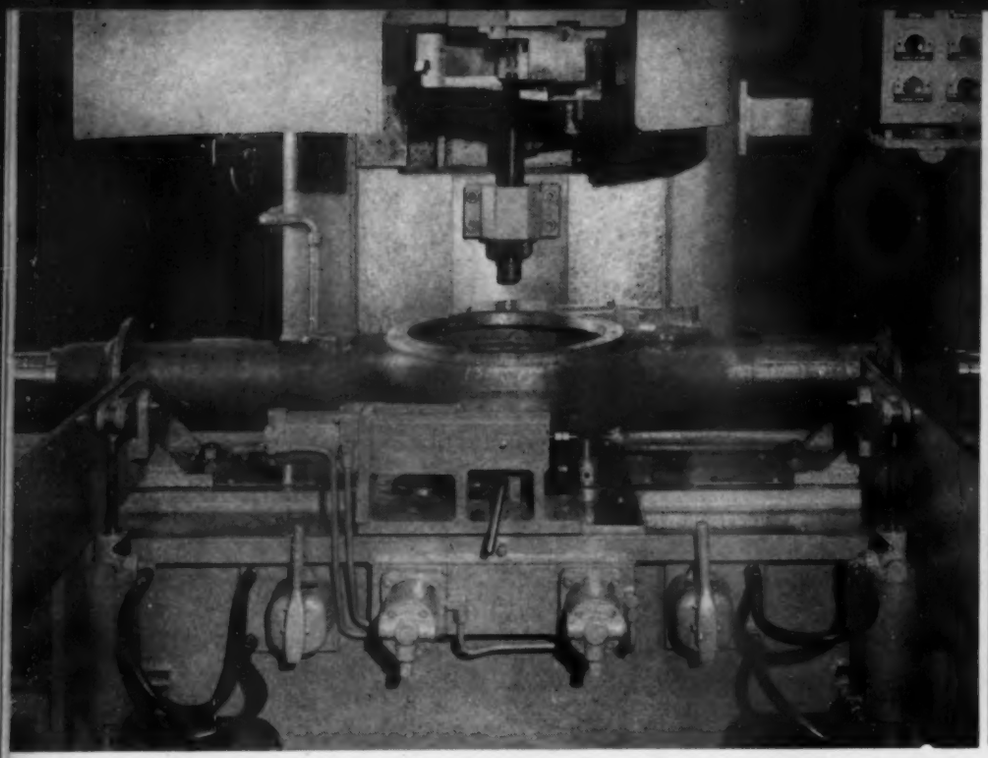


Banjo section in position and clamped for drilling. Coolant is directed by individual tubes from manifold around fixture. Lifting arms with V-carriers are in retracted position above right-hand drill head

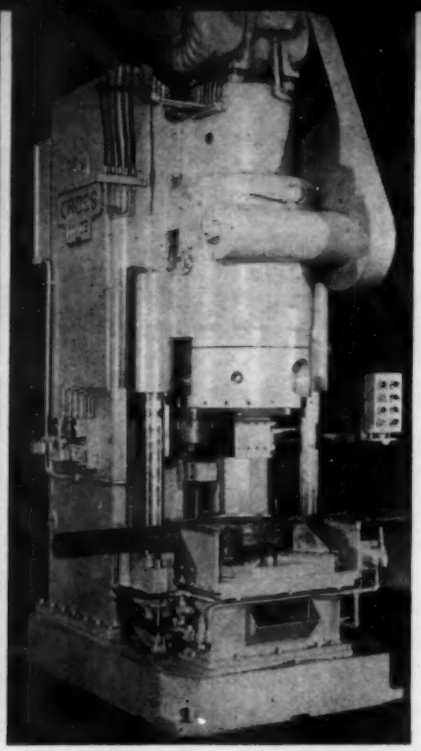




Rough and semi-finish boring fixture, showing the two single-point carbide tipped tools on the boring head. Motion diagram (left) shows how tools are retracted to avoid scoring finished surfaces



Boring and facing fixture in which hole is bored with the bar, and flange faced simultaneously by horizontal feed of rotating cross slide with rough and finish carbide tools. Hydraulic lifts place work on hardened ways



Special machine designed for rough and semi-finish boring banjo holes in both sides of housing

TRUCK AXLES continued

all on one horizontal shaft so lifting is uniform from end to end.

Carrier beam has one pickup arm less than the number of stations; in this case, four. They are operated hydraulically and engage the axles when the carrier is down. As soon as axles have been secured, the carrier beam is raised, work advanced one station, lowered into the machines or on to work rests, and released. The beam then rises and returns to starting position while work is being automatically clamped and machine cycles started. When all operations have been completed, work is released from fixtures and the beam lowered again. It then picks up four axles, transfers them and repeats the cycle.

It should be observed that the transfer mechanism moves the work from station to station only. It does not locate the work in any of the machines it serves. Location is left to workholding fixtures which are integral with each individual machine. This feature eliminates the need for keeping machines in exact relationship and alignment.

The transfer mechanism has been designed so additional sections can be added to accommodate additional machines or stations, should it become necessary to add operations or produce a different axle. This provides the same flexibility as straight in-line machining where parts are moved manually from machine to machine. The setup accomplishes the same results with only three comparable machines, a transfer mechanism, and one operator, as six machines and six operators when handled manually. Further, it is claimed that capital investment for the Transfer-matic is approximately two-thirds that required for the six manually operated machines.

New Cross boring and facing machines speed up finish boring and facing operations of the banjo hole. One of these bores the hole and faces the adjacent flange simultaneously. (Previous practice has been to bore the hole first, then face the flange.) It is claimed that production on this operation has been increased from 19 to 30 pieces per hr. at 80% efficiency; a saving of 37%.

Two single-point carbide tools are used, one following the other, to bore the hole, and two other tools are used for facing the flange. This method of facing leaves a very desirable surface known as "phonograph finish" because the spiral feed marks resemble the face of a phonograph record. It is claimed that this gives greater tightness to the gasket seal.

These new machines are equipped with boring and facing heads that have been under development at Cross Co. for several years and are said to have many applications where parts are large and not conveniently rotated. The boring head contains a boring bar or spindle slideably mounted in a quill, and a rotating cross-slide. Both bar and slide are fed hydraulically and have separate and independent hydraulic feed ranges. One feature is that hydraulic feed cylinders are connected directly to the boring bar and cross slide respectively without intermediate gearing or linkage.

Rough and semi-finish boring operations are also performed on Cross machines of identical design, but in these operations front and rear banjo holes are bored simultaneously. Two carbide single-point tools are used, one for each hole. Tools are held in a holder attached to the rotating cross slide of the boring head. Inasmuch as the two holes are bored the same diameter, tools must be drawn in toward the center to provide clearance.

Fixtures on these machines are so designed as to require a minimum of physical effort, as axles weigh over 200 lb. They are taken from the conveyor and placed on a pair of rails; the operator then slides them into the fixture where they are lowered into position with a power elevator and automatically clamped. After the machining cycle is completed, fixtures release parts and the elevator lifts them to the loading-rail level where the operator slides them out of the machine.

What to Look for in Hydraulic Oils...VI

LUBRICATING VALUE

Hydraulic oil must function as a lubricant. So it is best to use the right viscosity and make sure that the hydraulic fluid has the proper lubricating value

BY ANTHONY J. ZINO, JR., LUBRICATION ENGINEER

REPLACEMENT of worn parts continues to be a serious problem to users of hydraulic equipment. Although working parts operate constantly in oil, wear will occur because conditions within a hydraulic circuit are not favorable to formation of thick, *adherent* oil films. In other words, attainment of hydrodynamic lubrication is difficult or impractical.

To function satisfactorily as a lubricant, while also meeting the primary requirement of transmitting power efficiently, a hydraulic fluid must possess two independent service properties in suitable degree: (1) viscosity and (2) lubricating value. Strictly speaking, viscosity is a physical property, whereas lubricating value is related to the chemical nature of an oil and its affinity for metals.

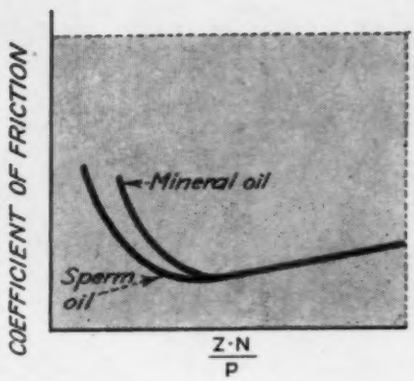
Thick-film lubrication is inconsistent with optimum viscosity for a hydraulic circuit. Installment II showed that there is one *best* viscosity for a *specified* circuit—otherwise fluid-friction losses adversely affect the volumetric efficiency of the pump, pressure in the system and sealant properties of the oil. Fluid-friction losses in thick film lubrication rise in proportion to viscosity, as shown by the general performance chart for journal bearings. To keep these losses as small as possible, it is essential to apply petroleum oils to hydraulic circuits so that they function close to the condition of boundary or greasy lubrication; that is, the working surfaces are incompletely lubricated.

In boundary lubrication, the major consideration is to minimize the frictional losses required to overcome:

1. Interlocking or "clutching" of surface asperities (high spots) of one moving surface with those of another (Coulomb's theory.)
2. The fields of force attributed to molecular attraction and adhesion between two moving surfaces (Hardy's theory).

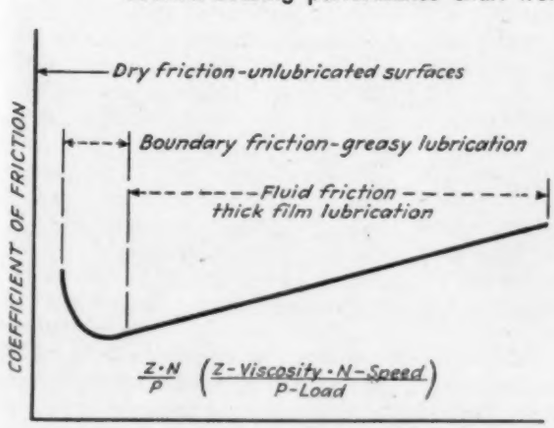
The measure of an oil's lubricating value is its ability to minimize friction and wear under these conditions.

Three characteristics affect the lubricating value of an oil: (1) oiliness, (2) extreme pressure or anti-weld properties, and (3) composition of the rubbing surfaces. Because of their importance, it is proper to define these characteristics, discuss what parts they play in hydraulics and list the present methods for evaluation.



***ANIMAL AND VEGETABLE** oils have more natural oiliness than petroleum oils, but are not used in hydraulic equipment*

Journal-bearing performance chart from Instalment II

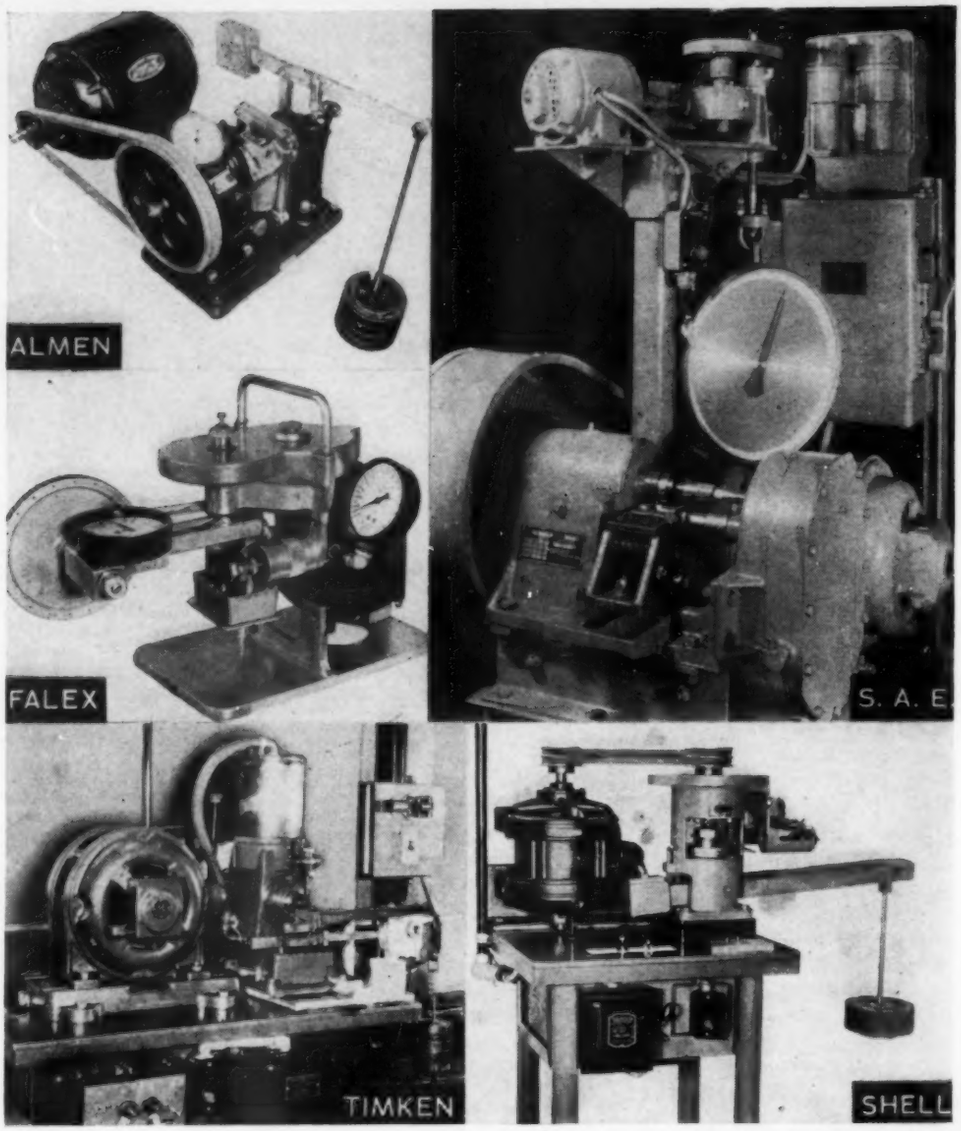

Dry friction-unlubricated surfaces
Boundary friction-greasy lubrication
Fluid friction thick film lubrication
COEFFICIENT OF FRICTION
Z·N / P (Z-Viscosity·N-Speed / P-Load)

***EFFICIENCY DROPS** if oil of too high viscosity is used in an effort to maintain thick oil films in hydraulic equipment. Lowest power loss occurs at "heel" of curve; hence, optimum-viscosity oil should be compounded with oiliness and extreme-pressure agents to minimize wear under conditions approaching boundary lubrication*

Oiliness

Oiliness is that chemical feature of an oil which permits it to "wet" metallic surfaces and establish a minimum coefficient of friction between the two rubbing surfaces under conditions of boundary friction. Oiliness is the result of presence of certain organic compounds—oiliness agents—which have a definite affinity for metallic surfaces. It is believed that these compounds are either selectively absorbed by the molecules of the metal surfaces or orient themselves in molecular layers upon these surfaces. Regardless of the mechanism of formation, these films are usually extremely tenacious and very effective in reducing friction.

The affinity of oiliness agents for metals is attributed to presence of some active polar group in their chemical structure. Morover, it has



***EVALUATION** of hydraulic oils with respect to their relative load-carrying capacity and anti-weld characteristics may be done with any of these five types of testing machines. No two of them rate oils in the same manner, but results from any one instrument can be correlated with tests made on hydraulic equipment*

been known for years that animal and vegetable oils possess these polar groups and that they have greater oiliness than petroleum oils. Although straight animal or vegetable oils are not recommended for hydraulic applications, small additions of these materials to petroleum oils are very effective in reducing thin-film friction. Other types of organic compounds possessing these same polar groups have been synthesized and are available for the processing of hydraulic fluids.

Oiliness Tests

Do Not Rate Performance

Because of the complex nature of the oiliness phenomenon, it is extremely difficult to establish either a scale or unit of measurement for this important property. Many oiliness tests and machines have been devised for research work, but none has ever been accepted as a standard. Present tests are of unquestioned value for indicating the presence of oiliness agents but are not conclusive from the standpoint of service performance.

Despite lack of practical methods for evaluating oiliness, its importance in all hydraulic fluids cannot be overlooked. Oiliness insures the presence of a thin, protective adsorbed oil film of low frictional value on the contacting surfaces at all times. Its value becomes increasingly important when one realizes that petroleum oils are deficient in this characteristic and have a tendency to leave metallic surfaces dry when subjected to the effects of heat and pressure for a prolonged period.

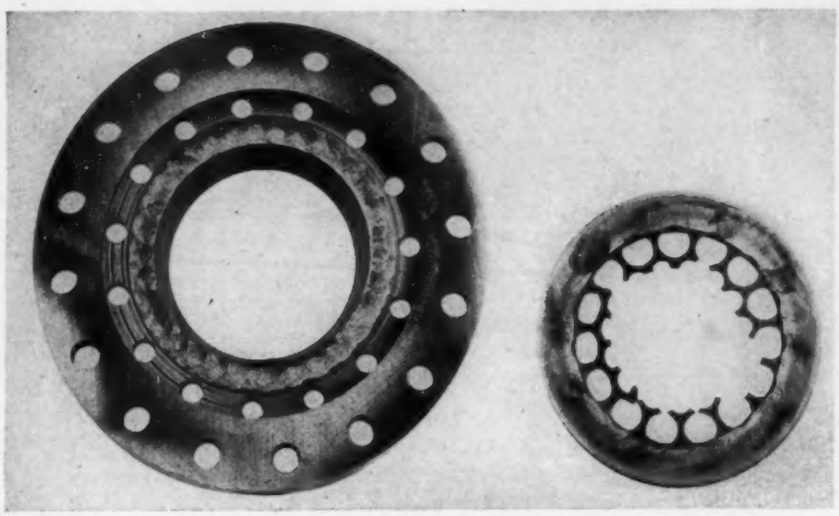
It is also true that the starting torque required to set a hydraulic circuit in operation is much greater when fluids of low oiliness are used. Such fluids permit greater metal-to-metal contact or "clutching." Hydraulic fluids possessing high oiliness insure lower static and kinetic frictional losses. Lower rates of wear are also obtained by their use.

Extreme-Pressure Characteristics

The ability of an oil film to resist rupture and prevent seizure under operating conditions of high unit pressure and temperature is termed the extreme-pressure of anti-weld characteristic of the oil. This second important component of lubricating value is directly related to the oil's wear-reducing qualities. As in the case of oiliness, the extreme-pressure properties of an oil are also attributed to presence of organic compounds and their increased chemical activity under extreme conditions of boundary friction. The organic compounds which impart added load-carrying capacity to the

oil film and improve its wear-resisting qualities are known as extreme-pressure additives.

These additives are principally organic compounds containing sulphur, chlorine or phosphorus within their chemical structure. Also classified as extreme-pressure additives are such products as sulphurized fatty oils and lead soaps. When high unit pressures and temperatures are developed between rubbing surfaces, the extreme-pressure additives become chemically reactive with the metallic surfaces and form metallic chloride or metallic sulphide films. These surface films, because of their lower fusion temperatures, function as solid lubricants and reduce the amount of wear and prevent seizure. It has also been learned that high spots are chemically polished and removed during the process.



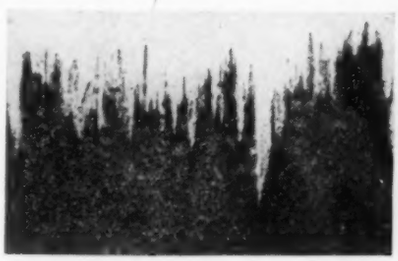
***SEIZURE** of a rotary valve and end plate caused the hub of the valve to tear out. Such components are finely finished by the manufacturer; failure occurred because the maintenance oil supplied lacked ability to form protective films under conditions akin to boundary lubrication*

The testing machines most commonly used for evalution of the relative load-carrying capacity and anti-weld characteristics of petroleum oils are the Timken, Almen, Falex, S.A.E., and Shell four-ball machines. Each machine is designed so that a film of lubricant is initially interposed between the metal test pieces, and provision is made for insuring a constant supply of the oil to these rubbing surfaces. They differ in types of bearing metals used, design of contacting surfaces, rubbing speeds, and method and rate of load application. Ultimate load at which the oil film fails, as evidenced by seizure or excessive wear and galling of the test pieces, is used as an index of the load-carrying capacity or anti-weld limit of the oil.

Results obtained with these machines are unquestionably indicative of an oil's ability to retard seizure. But because of basic differences in design and operation, these testing

Geometrical Changes | **Metallurgical Change**

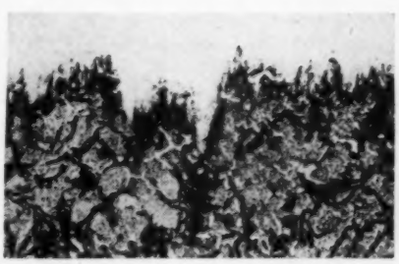
SAE 52100 STEEL



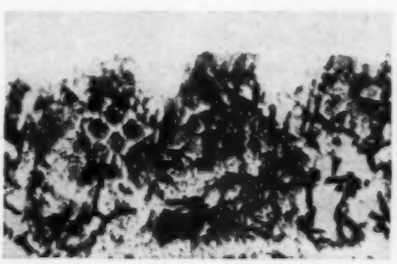
Tapered section before friction test: 46 microinches

After friction test: 37 microinches

CAST IRON

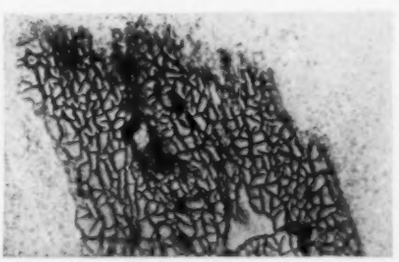


Before friction test: 55 microinches



After friction test: 40 microinches

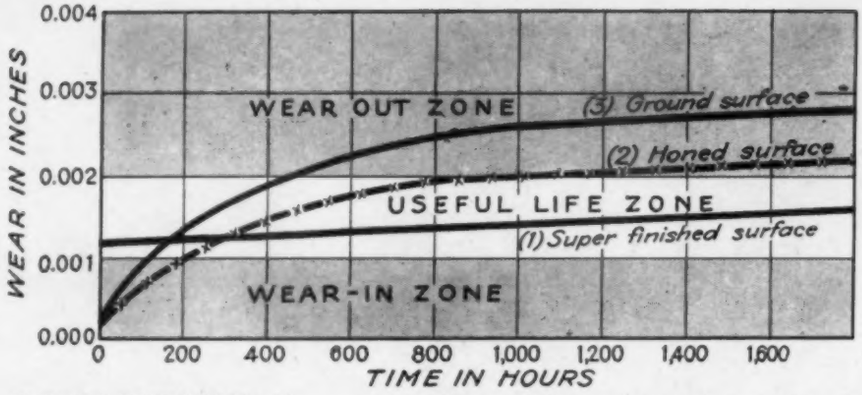
CHROME STEEL



Lubrication failures, then decomposition of oil at high rubbing temperatures, bring on changes in structure

These illustrations are reproduced from a paper presented by B. W. Sakmann, before the American Society of Mechanical Engineers.

***GEOMETRICAL CHANGES** and structure transformations occur when hard metal articles are run together under friction-producing conditions. Finely finished steel surfaces, such as found in pumps and hydraulic valves, might well be subjected to roughening and formation of ridges if allowed to rub under pressure*



***SURFACE ROUGHNESS** of pump and valve parts has a lot to do with life of the equipment, considering conditions of boundary lubrication that must be faced. Field experience with equipment failures has demonstrated the value of superfinish for such parts*

machines produce widely divergent values, and no two machines rate the extreme-pressure characteristics of a series of oils in the same order. Therefore, in evaluation of extreme-pressure characteristics of hydraulic fluids, the results of these machines must be correlated with carefully controlled tests of hydraulic equipment.

High Film Strength

The ultimate load-carrying capacity, or wear-resisting characteristic, of an oil's film, as determined by any of the laboratory testing machines, is of real value in hydraulics. Although of relative nature, the test results may be correlated with field experience. From inspection of worn and scored pumps and valve surfaces, it is evident that extreme-pressure conditions do exist within a hydraulic circuit. Resultant wear is traceable to the mineral oil's natural limitations and deficiencies and to faulty machine design. Inability of an oil to form adherent films that will resist high unit pressures at all operating temperatures and rubbing speeds is usually evidenced at these points in hydraulic circuits:

1. Between leading edge of vanes and annular ring of vane-type pumps.
2. Along the line of contact between the mating teeth of gear-type pumps.
3. Between connecting rod and piston of certain types of axial-piston pumps.
4. Between piston and wabble plates of other types of axial-piston pumps.
5. Between rotary valve plates and housings.

Manufacturing practices for hydraulic equipment, as far as surface finish and controlled clearances are concerned, necessitate the use of hydraulic fluids with both oiliness and extreme-pressure characteristics. This is particularly true and highly essential while the hydraulic equipment is still new. Experience has proved that the metallic surfaces are better prepared for their later wear-life, when such fluids are used during the running-in period.

The previous statement is supported by the work of B. W. Sakmann.* Conclusions reached from his research were that geometry of steel and cast-iron surfaces were changed during running-in tests. The peaks of initially rough surfaces were flattened, whereas initially smooth surface were roughened. When the surfaces were run against a soft bearing material, only geometrical changes were observed. On the other hand, when two hard surfaces were run against each other, metallurgical transformations were observed in addition to the purely geometrical changes. His experiments also showed that the smoothing of roughness peaks could be accelerated by suitable addition agents in the lubricant.

To prolong the service life of various working components in a hydraulic circuit, it is essential that all moving surfaces subjected to high unit pressures and high rubbing speeds possess superfinished surfaces. The value of a superfinished surface and its effect on the "wear-life" of metals were shown by Arthur M. Swigert, Jr. in his book, "The Story of Superfinishing" and illustrated by the chart "Graph of Wear Zones."

Field experience also indicates that a greater degree of control is essential in the manufacture and assembly of pump and valve parts. The establishment of running-in standards and procedures for valves, as well as for pumps, is necessary for longer equipment life and elimination of field complaints. And a hydraulic circuit should be designed so that a slight back pressure is maintained at all times to insure positive lubrication.

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* *"Geometrical and Metallurgical Changes in Steel Surfaces Under Conditions of Boundary Lubrication" —Journal of Applied Mechanics, March, 1947.*

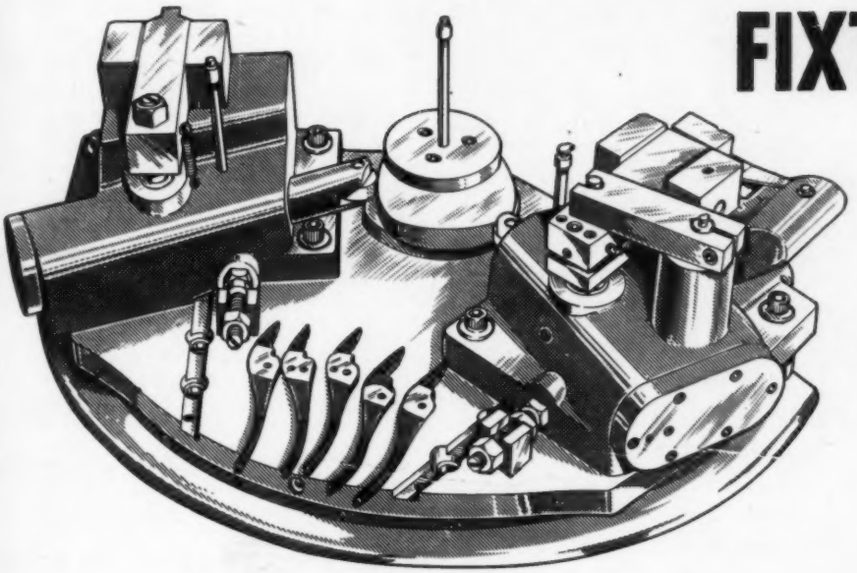
Part VII—Rust and Corrosion will appear in an early number.

Moisture in Cutting Oil Bad for Carbide Tools

MOISTURE in chlorinated and sulfurized cutting oils may cause failure of the cutting edge of cemented-carbide tool tips, according to an 11-page research report PB-49077 available in photostat form for $1 from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Checks should be made payable to the Treasurer of the United States.

The report, prepared for the Watertown Arsenal, states that moisture weakens the tip by attacking the cobalt binder. Accelerated corrosion tests were conducted by immersing carbide tips in soluble cutting oil, plain mineral oil, sulfurized cutting oil and sulfo-chlorinated cutting oil for periods of 160 hr. at 200 F. Tips immersed in moisture-free oils and in water-bearing soluble oil showed no corrosion. Marked loss in weight occurred by immersion in water-bearing sulfurized and sulfo-chlorinated oils, the latter producing the more pronounced attack. Some tool engineers assert that failure of the carbide tips results from fatigue or high temperature and not corrosion. But since these tests indicate corrosive attack with two classes of oils, it may be advisable to take steps to prevent moisture condensation in such oils.

A Handbook of VERTICAL SURFACE-BROACHING FIXTURES . . . II



BY BEN C. BROSHEER
ASSOCIATE EDITOR, AMERICAN MACHINIST

With broaching machines already operating at optimum cutting speeds, the only avenue to increased production lies in cutting down the time required to load and unload the fixtures in an effort to obtain continuous cycling of the machine. This, however, must be done without imposing increased physical effort on the operator. Automatic shuttling and swiveling tables facilitate work handling and furnish a source of power which, by suitable mechanical linkage, may be used for operating clamping mechanisms and backup stops on the fixtures.

Where conditions warrant, pneumatic or hydraulic clamping devices combined with electrical interlocks will contribute greatly towards making broaching operations continuous and fully automatic.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

MOST modern single- and dual-slide vertical surface-broaching machines are made with automatic, moving tables which withdraw the workholding fixtures from the broaching position before the broach slides start back on their return strokes. This both clears the work from the broach teeth on the return stroke, and permits the operator to unload and reload the fixture while the slide is being returned.

Receding tables are operated mechanically or hydraulically and are interlocked with the motion of the vertical slides in the interests of safety. Usually, they are arranged so they move back into broaching position automatically when the operator moves control levers or pushes safety start buttons to initiate a broaching cycle. In such cases, the slide automatically starts down on the cutting stroke when the table reaches the broaching position—but it cannot move until the table is in that position.

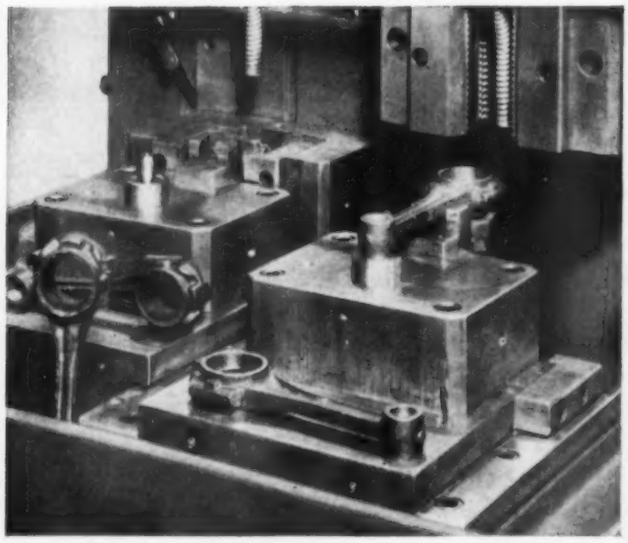
Several different types of moving tables have been developed. In one type the table is moved horizontally at right angles to the travel of the broach slide, the action being the same whether built into a single- or a double-slide machine. For double-slide machines, two tables are used, one for each slide. In another type, the table is swiveled about a vertical axis to move the fixture into or away from the broaching position. Another well-known type is the rocking table which swings into and out of broaching position on a horizontal trunnion shaft. All three types are suitable for most surface broaching operations, although fixture design must be based to a large extent upon the table motion on which the fixture is to be used.

During the last five years, rapid progress has been made in development of tooling to permit application of vertical surface broaching to a wider range of parts. Many modern workholding fixtures for receding table-type machines are mechanically, hydraulically or pneumatically operated, the later two types being most suitable for applications where production volume justifies the extra expense required to achieve maximum loading and clamping efficiency. When hydraulic or pneumatic operation is selected, it usually includes automatic clamping and continuous-cycle operation of the broaching machine.

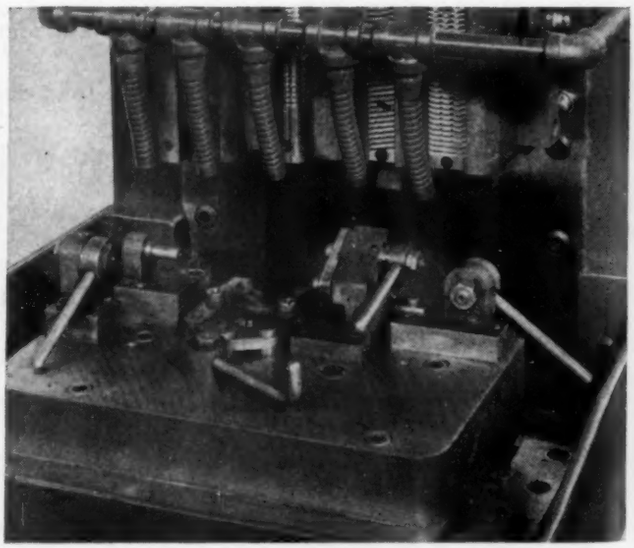
Vertical machines usually have pads on the front of the machine, as well as on each side of each receding table for mounting auxiliary units to operate clamps, locks and support jacks on the fixtures, and arrangements can be made to use the hydraulic system of the machine for clamping workpieces in the fixture.

Tool slides are designed for mounting long, wide, multiple broaching tools for a variety of operations. Vertical and horizontal slots in the faces of some slides permit using large keys to locate broach holders and resist shear loads. Other machines have slides arranged with a solid dovetail on one side for alignment of broach holder, with multiple dovetail clamps on the opposite side. This type retains the cross key for driving. This minimizes setup time for tool changes and is especially desirable for small-lot broaching when tool changes are frequent. Both the stroke and the position of the tool slide are adjustable and can be set to suit individual setups. Rate of slide traverse ordinarily is adjustable on the broaching stroke. A high-speed slide

Shuttle Fixtures... WITH HAND OPERATED CLAMPS



No clamping is needed, even for surface broaching, when tool pressure forces part down against fixture without danger of cocking it. Here, an Oilgear XD-12 double-slide machine with shuttle tables is used for broaching six surfaces, sides and both ends, of bolt bosses on 600 steel connecting rods per hr. Stock removal is 5/64 in. max.

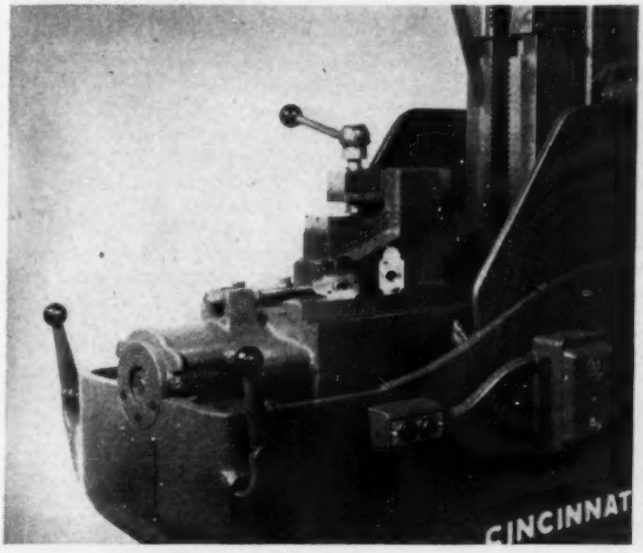


Cam and toggle clamps, simple and inexpensive to make are used in this setup on an Oilgear XS-30 single-slide machine with shuttle table for handling five different parts at the same time. Any one fixture may be used alone, or all five loaded for each stroke. Separate nozzles direct large streams of cutting fluid above each fixture

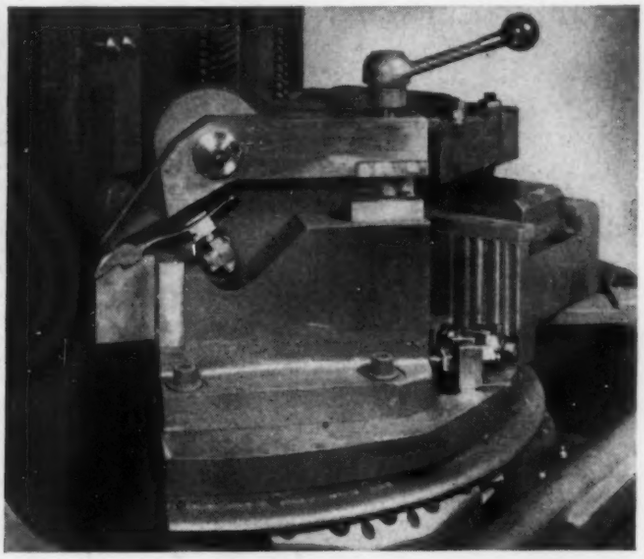
return is provided in single slide machines. Slide speed is the same in both directions in most dual-ram machines.

For many operations, hand-operated clamps are satisfactory. Best practice is to position the clamp so pressure is directed downward on top of the part near the broaching plane, and to support the part directly under each clamping point with hardened steel blocks or with equalizing jacks. It is important that clamps and supports used in broaching fixtures be so designed and positioned that it will never be possible for them to extend into the broaching area. If this is not done, an expensive broach may be damaged or destroyed.

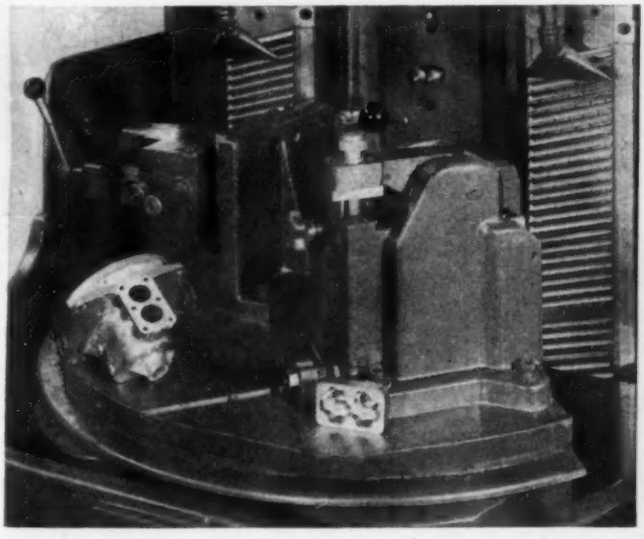
Mechanically operated locating and clamping fixtures are more expensive than manually operated fixtures. However, such fixtures sometimes are necessary in order to meet high production requirements and reduce operator fatigue. In cases where manual clamping takes so long that continuous-cycle operation of the machine is not possible,



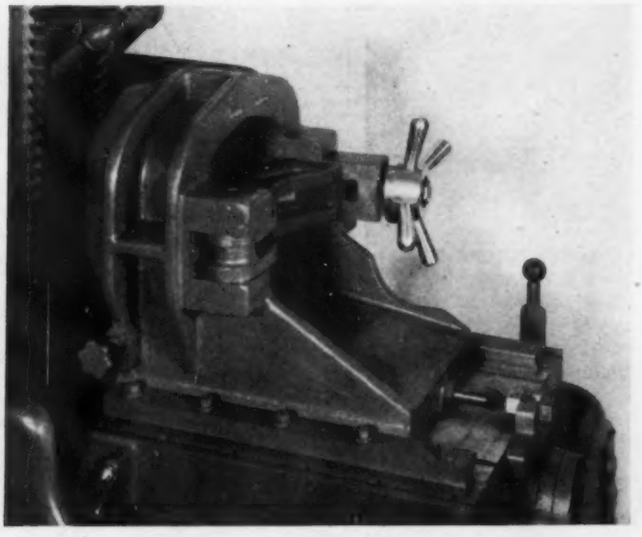
Screw-operated clamp lever on hydraulic receding table of this Cincinnati 3/48 Hydro-Broach holds forged steel pump body for broaching four radii and two sides at 40 fpm. Approximately 3/32-in. stock is removed from each side and ¼-in. from radii. Part is located from bottom face and two reamed holes. Production is 193 per hr.



Both sides of a half-section of pliers are straddle-broached in this hand-operated screw clamped fixture on left-hand side of swinging table of a Cincinnati 3/48 duplex Hydro-Broach. Inside and outside surfaces of jaws are broached in mechanically clamped right-hand fixture on same machine. Average production is 150 pieces per hr.

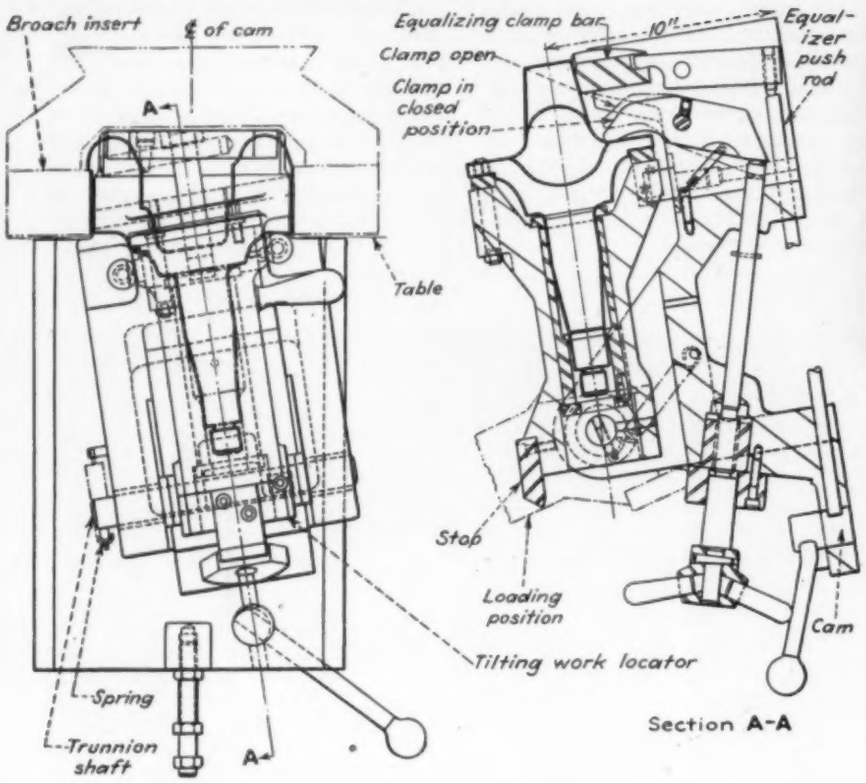


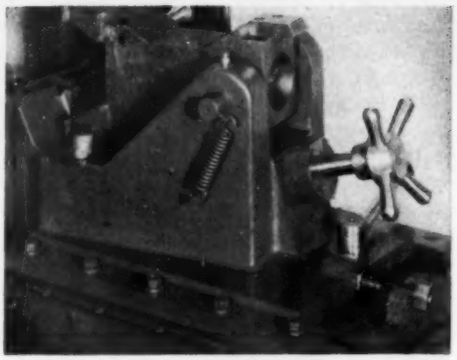
Mating surfaces on air-compressor aluminum cylinder and head castings are handled at the rate of 314 per hr. in this setup on a Cincinnati 10/66 duplex Hydro-Broach. Both fixtures have screw-type hand clamps, left-hand fixture holding cylinder casting, and right-hand fixture holding the head. Slab-broaching inserts have two carbide-tipped finishing blades at top end to insure flatness



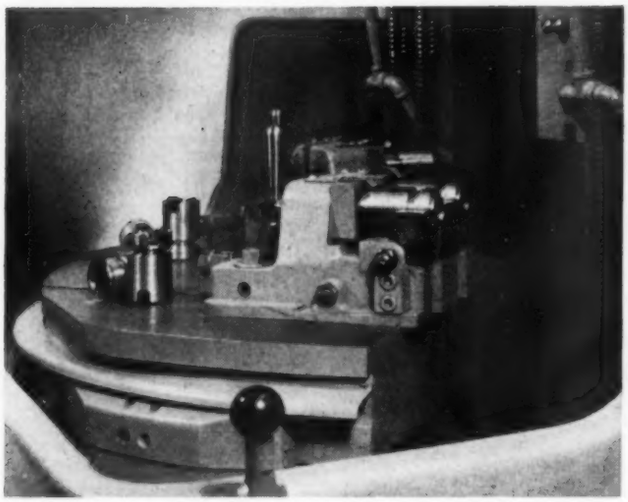
Swing gate clamp permits work to be loaded from back of fixture. Automobile steering knuckles are broached at 75 per hr. on a Cincinnati 10/66 Hydro-Broach by inserting spindle of forging into center of broach holder on ram which is dished to clear part. Table is shown in receded position and is pulled forward into broaching position by shuttle action

HAND OPERATED CLAMPS continued

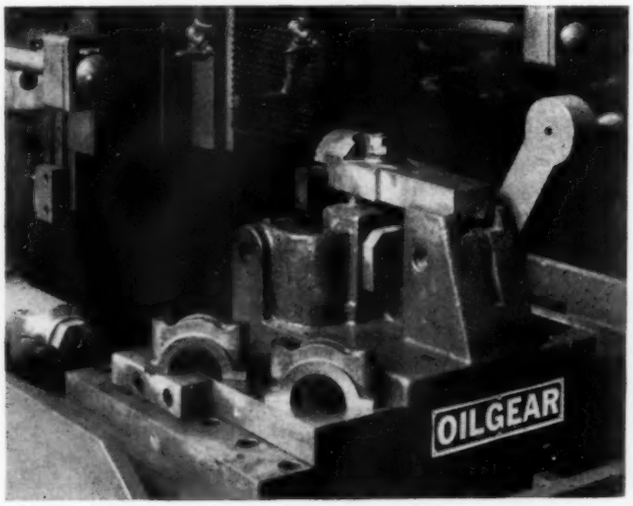




Floating-type, hinged locator is used when broaching outside surfaces of kingpin bosses on steering knuckles on receding table of a Cincinnati 10/66 single-ram Hydro-Broach. For loading, locator is tilted to vertical position by hand so forging can be positioned with spindle down. When tilted forward into broaching position, lugs on work rest on an equalizing support at front of fixture. Clamping is done by hand, and production is 74 per hr. at a ram speed of 22 fpm. Handwheel screw forces a pushrod against lower end of work clamp, and a cam lever is used for actuating a pushrod for locking the equalizing support



V-blocks support the end, splined arbors furnish location, and no clamps are required when slotting both ends of steel sleeves in a two-position fixture on a Cincinnati 10/54 duplex Hydro-Broach. Left-hand fixture is used for one end and right-hand for opposite end. Centerline of spline and finished slot must intersect at a given point within ±0.0005 in., and chamfers at opening of each slot must be concentric with centerline of spline within ±0.003 in. Broach assemblies and the splined arbors and V-blocks are adjustable for accurate alignment

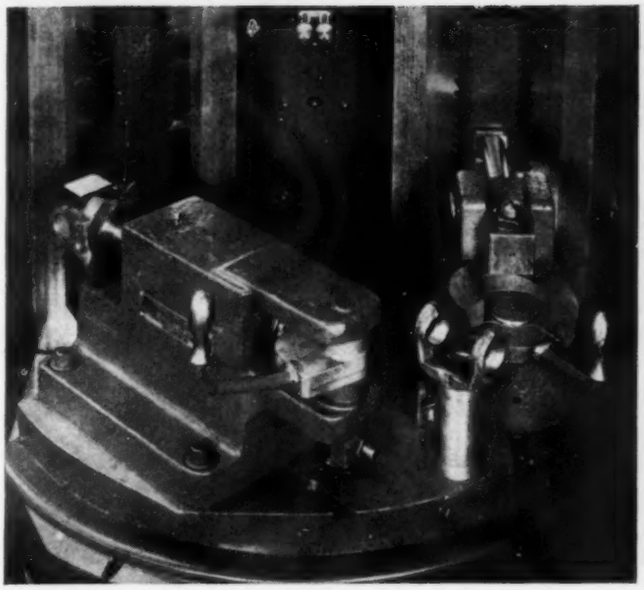


Heavy-duty, hand-operated, cam-clamped fixture mounted on shuttle table of an Oilgear machine for surfacing connecting-rod caps. Hand lever is counterweighted to increase clamping force, and an equalizer is employed on clamp jaw to insure even clamping pressure on both ends of the workpiece. This is a relatively low production job and consists of surface broaching connecting rod caps one side at a time. By interchanging fixtures the slab cutter shown can be used for a wide variety of different surface broaching operations

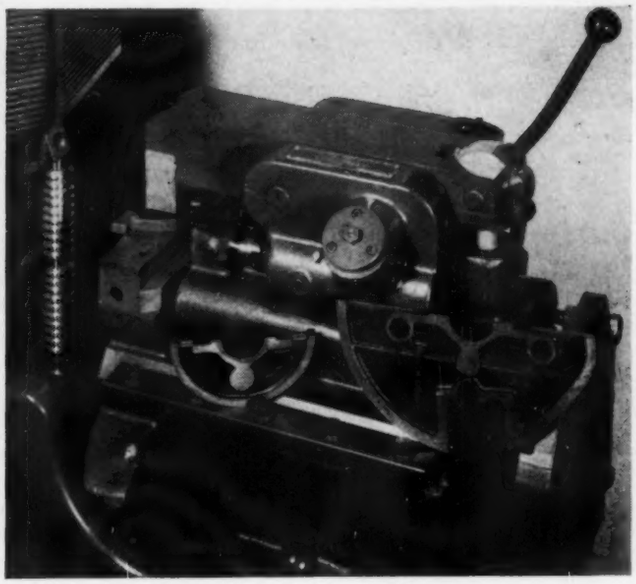
and a large quantity of parts must be broached, mechanical, hydraulic or pneumatic clamping can be justified on the basis of lower production costs. Of the three methods, mechanical clamping is the least expensive and ordinarily is selected unless clamping must be accomplished quickly in several directions.

Usually, mechanical clamping devices are used on machines with moving tables. For this reason, the table motion is employed to actuate clamping and locating devices.

Use of pneumatic and hydraulic cylinders for work location and clamping has been growing in recent years. Such fixtures are more expensive than manually and mechanically actuated types, and the extra cost usually can be justified



Quick-acting, cam-operated clamps of two different types are used for straddle broaching outside ear surfaces of universal joint yokes on a Cincinnati 5/54 duplex Hydro-Broach. Cross pins are inserted in holes in part before broaching. In left-hand fixture, pin rests on hardened support block, and a plunger, operated by cam at rear, enters hole in shank to hold part against end stop. In right-hand fixture, part is placed on locating stud, and rotation of face cam forces this down so pin rests on hardened support block. High speed broach inserts are used

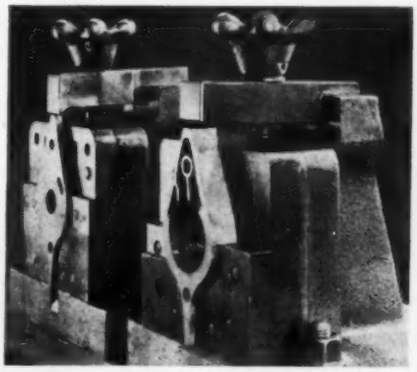


Ninety-six different cast-iron cams can be handled in this one fixture on a Cincinnati 5/54 Hydro-Broach. Parts vary from 5½ to 12½ in., and parting face and half bore are finished at 140 per hr. As machine cycle starts, table moves forward and two plungers move up against back of part to position it against front locators. Work is clamped with cam-operated lever, and then front locators are automatically pulled back under fixture to clear tools. By installing air or hydraulic cylinder to operate clamp, fixture can be made fully automatic

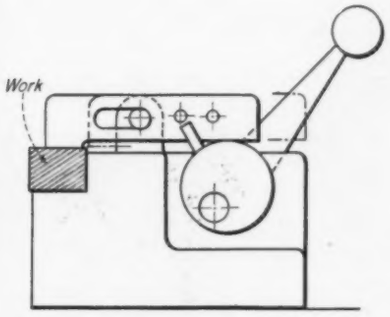
only when use of power clamping reduces workpiece unloading and reloading time to the extent that continuous, automatic-cycle operation of the machine is possible. Power clamping also is advantageous in reduction of operator fatigue.

When hydraulic cylinders are used, they can frequently be operated from the hydraulic circuit of the machine, and fixture actuation can be interlocked with movement of the slide by proper valving. In addition, hydraulic cylinders are usually smaller than air cylinders for the same application because in most cases higher operating pressures are used in hydraulic circuits than in air circuits. However, the more rapid speed of operation offered by air cylinders is often a deciding factor.

Solenoid valves are sometimes used to interlock air and hydraulic cylinder operation with slide movement. To date, most applications of air and hydraulic cylinders to broaching fixtures have been in the surface-broaching field, where vertical-slide machines with moving tables are employed. In a few cases, air-operated fixtures have been applied to horizontal broaching machines, but the larger field of application is in the vertical group.



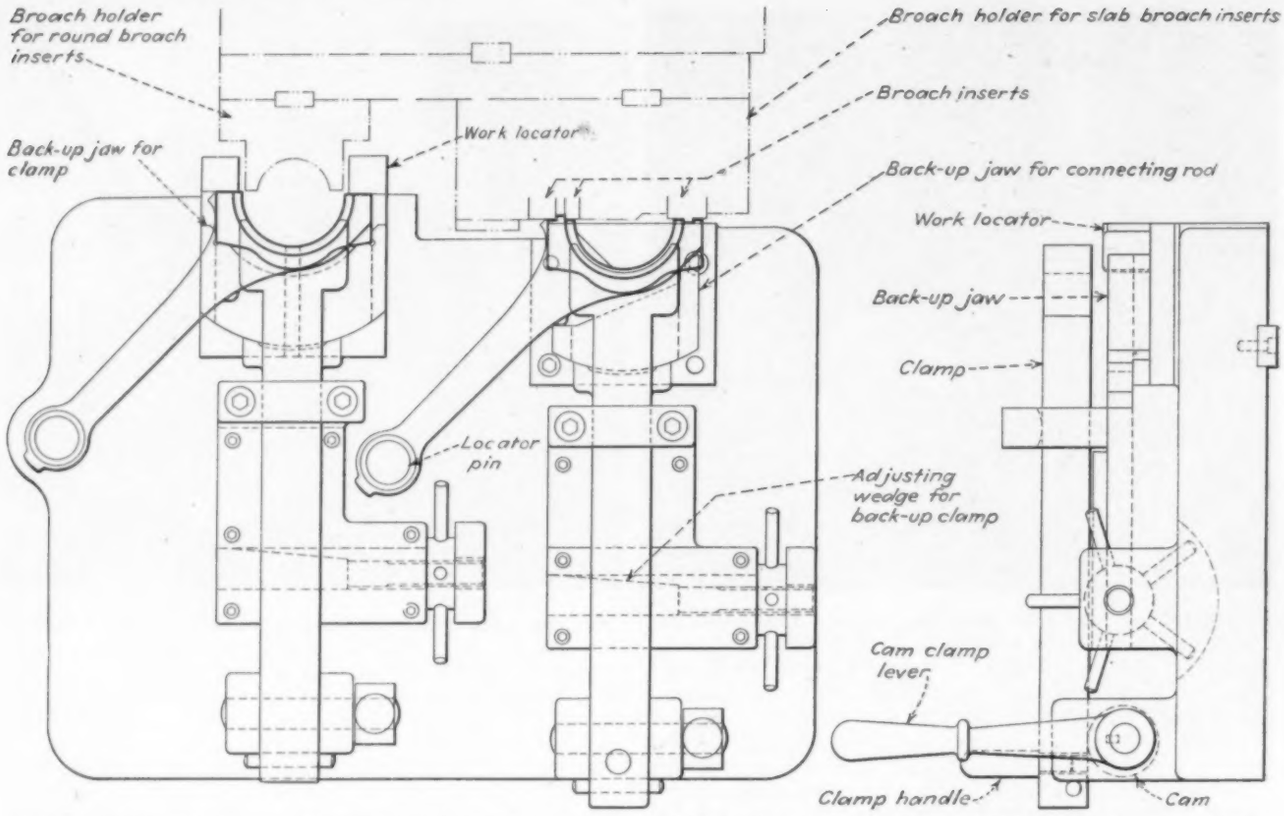
Relatively thin, flat castings can be surface broached without difficulty if fixture design is correct. Here a gearbox and cover are hand clamped for simultaneous surfacing on receding table of an Oilgear XS-10 machine. Locating blocks are shaped to fit parts, and clamp arms are spring loaded to hold them off workpieces until hand nuts are tightened



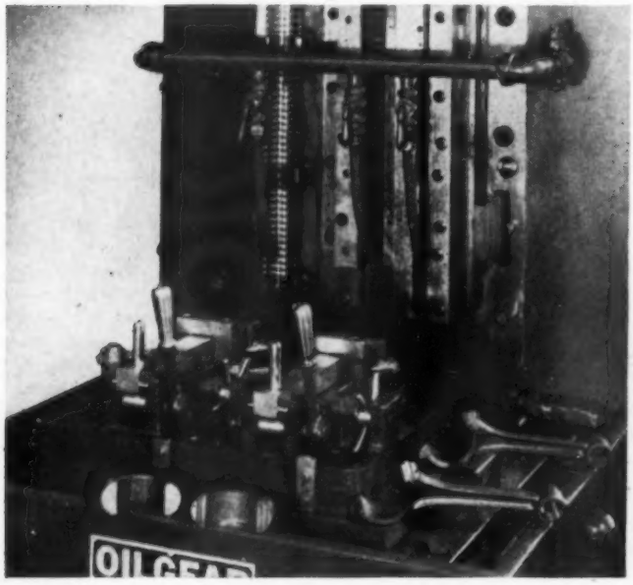
Efficiency of hand-operated cam clamps can be improved by adding pins, as shown here, so clamp bar is moved back from over workpiece as cam is turned to release clamp. When new workpiece has been positioned, turning cam shaft moves clamp bar forward and tightens clamp in one motion. Several variations of this arrangement may be made to suit particular conditions

The information and illustrations contained in both the first and second parts of this report were compiled from numerous sources, and the sincere appreciation of the editors is expressed to the following companies for their whole-hearted cooperation in this project:

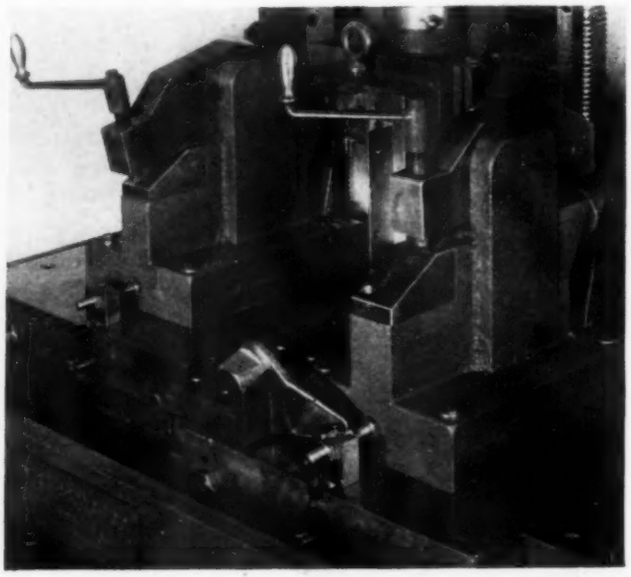
American Broach & Machine Co., Cincinnati Milling Machine Co., Colonial Broach Co., Detroit Broach Co., The Foote-Burt Co., Lapointe Machine Tool Co., National Broach & Machine Co., The Oilgear Co., and U. S. Broach Co. Much data was also supplied through the courtesy of the Broaching Tool Institute and through numerous broaching machine users.



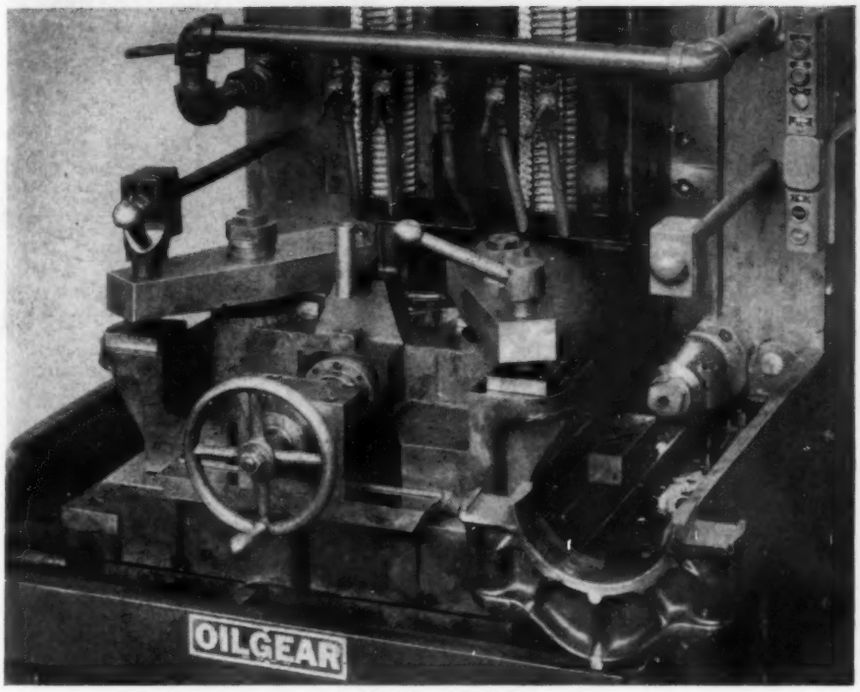
Successive operations on either connecting rods or caps are performed in this dual fixture designed by National Broach & Machine Co. for an Oilgear XS-20 single slide machine. Clamp bar is cam-operated by a vertical lever, while backup jaw is positioned by a wedge controlled by a starwheel. Operations include rough and finish broaching joint face, lock fits, boss face and half-round bore. Clamp is released with one hand, retracted with the other



Manually clamped fixtures for tractor engine connecting rods and caps, details of which are shown in drawing above. Each is designed with two similar clamp units. Clamp arm is released with one hand and pulled back from over workpiece with other hand. Fixtures were developed by National Broach & Machine Co., and will hold either a rod or a cap forging

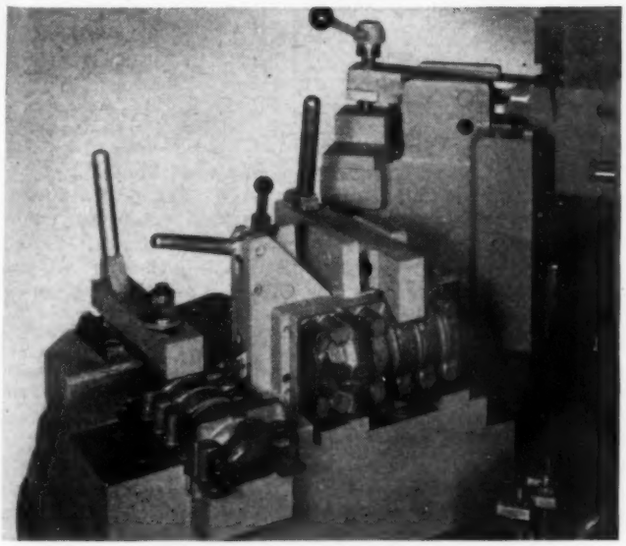


Rapid disengagement of clamp arm from workpiece is effected in this fixture by releasing clamp screw, pulling back the arm by hand, and allowing it to slide down the inclined face of hardened steel support block. When new part is in position for clamping, a forward thrust on end of bar returns it to position and a few turns of the screw lock it securely. Machine is a Colonial dual ram

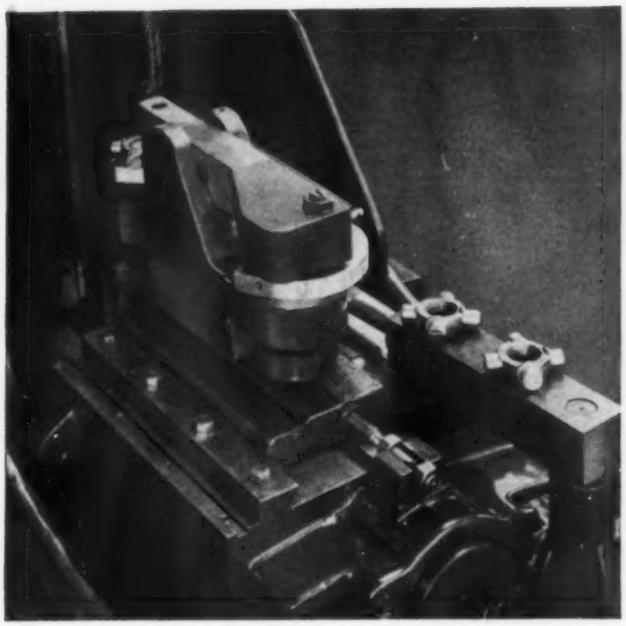


Ten strokes of the slide are required to remove 1¼ in. stock from two joint faces of connecting rod caps on this Oilgear XS-50 single slide machine. Fixture is advanced 0.125 in. between strokes by handwheel shown. Two screw-operated clamps are swung outward to permit removal of work. Final cut is taken with fixture slide tight against positive stop on machine frame

Two different surfaces are broached on each of two parts at the same time in this setup on a large Oilgear XD-10 double slide machine. A number of interchangeable fixtures have been developed for the machine shown, so job lots of different castings can be broached economically. Hand clamping is used to keep tool costs low. Receding tables move back about 5 in., giving ample room for changing castings while ram returns



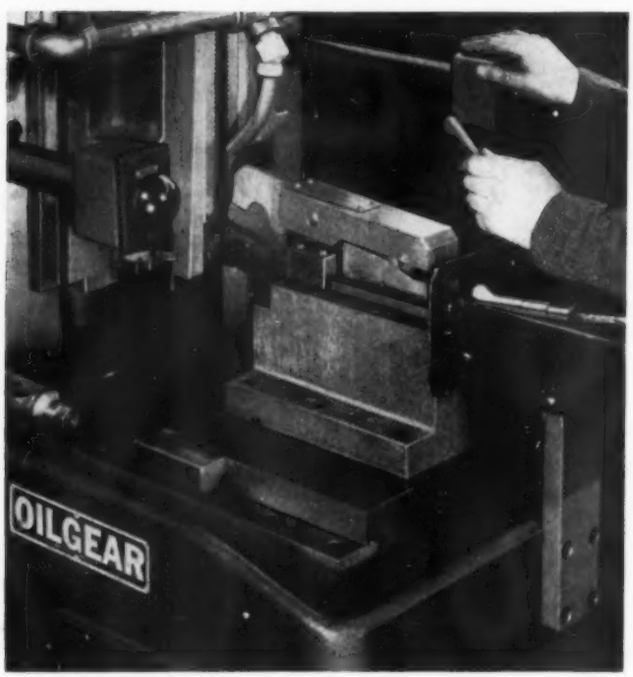
Cast-iron bearing caps are surface-broached at high production rates on this Cincinnati 10/66 duplex Hydro-Broach. Parting face is finished flat within 0.002 in., and locks and bevels are faced by left-hand ram. Top, rear end of rear cap and cork grooves are broached by right-hand ram. Caps are cast en bloc and the three fixtures will take castings for either 6- or 8-cyl. engines. Cam-type hand clamping devices provide adequate support for castings in all three positions

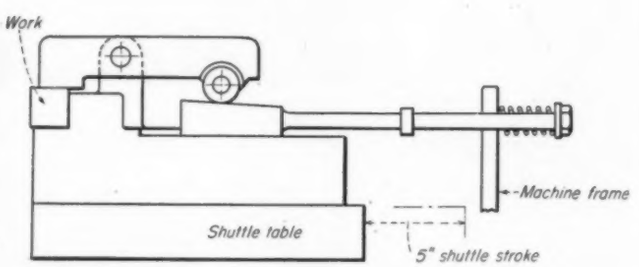


Back and forth and up and down movement of clamp on this fixture is obtained through action of cam shown at rear. Advance and retraction of table provides power for clamp actuation through spring-loaded arm at right. Fixture is used on a Cincinnati 5/54 Hydro-Broach for facing four trunnion ends of universal joint yokes. Parts are centered from center hole, and trunnion arms rest on two half-round and two flat hardened support pads. Clamp has equalizer which bears on either side of center hole. Output averages 204 pieces per 52-min. hr. with ram speed of 41.3 fpm. cutting and 68.5 fpm. return

Bridle around machine column carries spring-loaded plungers which press down overhead clamps when fixtures swivel into position. Workpiece is located by horizontal studs engaging holes in side of body, and by stud on clamp engaging vertical hole. Jack at rear gives added support. When clamp is pushed down, tripping lever holds it until it is engaged by spring plunger, and at the same time machine cycle is preset. For unclamping, vertical lever at rear is tripped and clamp swings up by spring pressure. Production is 346 per hr. on a Cincinnati 5/54 duplex Hydro-Broach

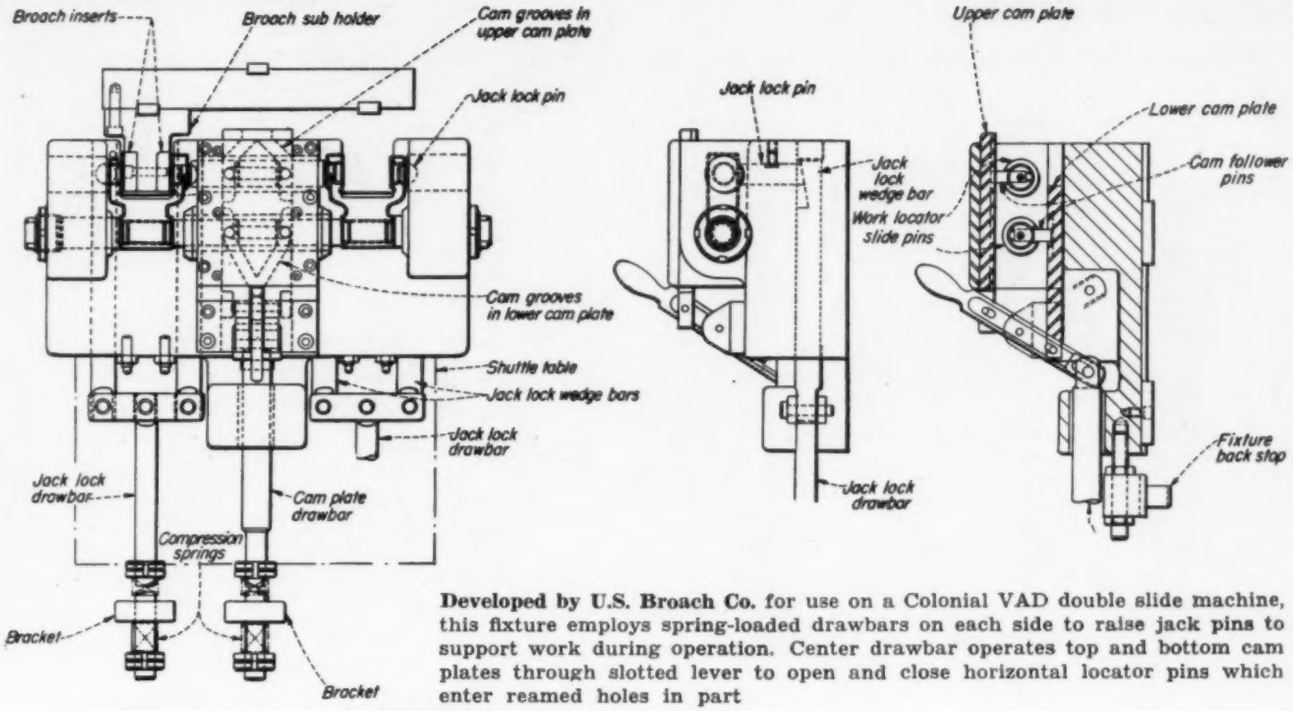
Shuttle Fixtures... WITH MECHANICAL CLAMPS



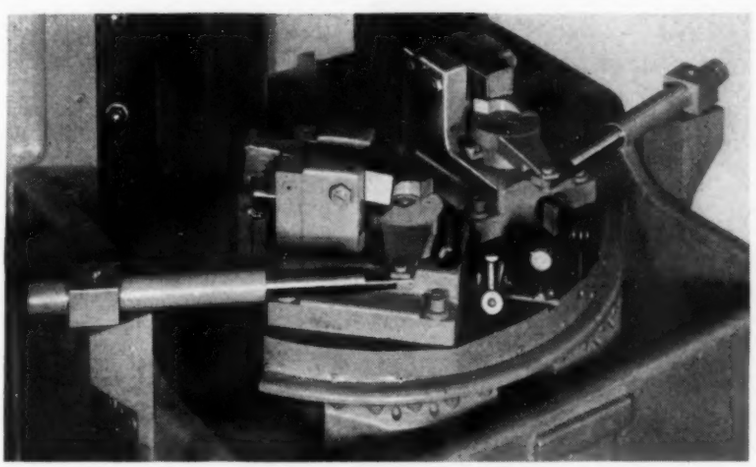


Operating principle employed in many mechanically operated automatic clamps for fixtures on shuttle-type tables. When table moves into broaching position, clamp bar roller moves up hardened wedge to clamp work. Spring loading of wedge drawbar, which is free to slide in fixture, adjusts clamp automatically when workpieces vary in thickness

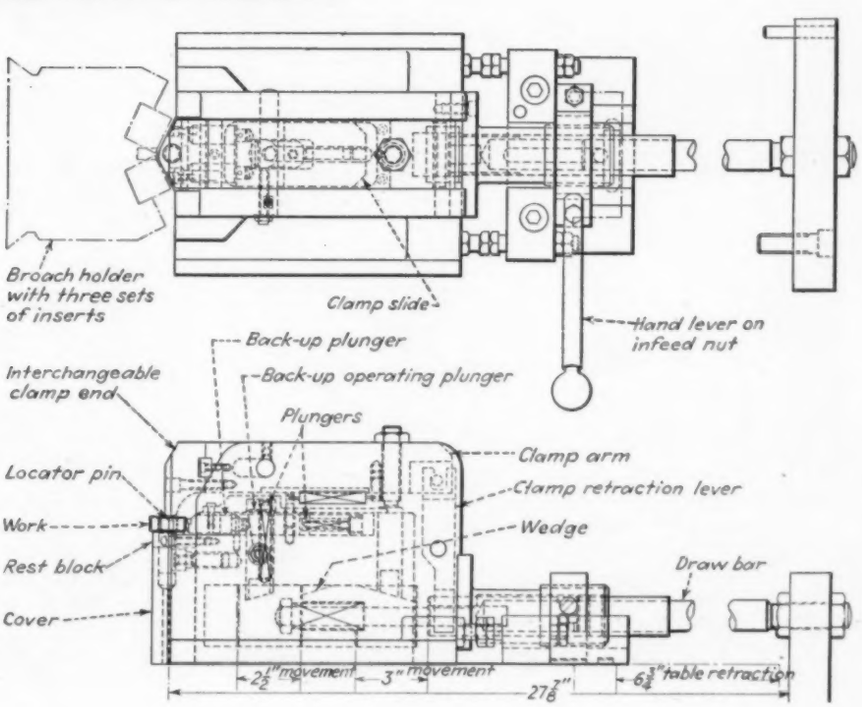
Automatic clamping and unclamping on this Detroit Broach Co. fixture is accomplished by moving roller under back end of clamp bar over hard steel wedge on end of drawbar secured to machine table bracket. The 5-in. stroke of shuttle table is sufficient to operate clamp. Operation consists of removing about 0.060-in. stock from three steps on each side of workpiece at 240 per hr. Even pressure is assured by equalizer jaw on front end of clamp bar



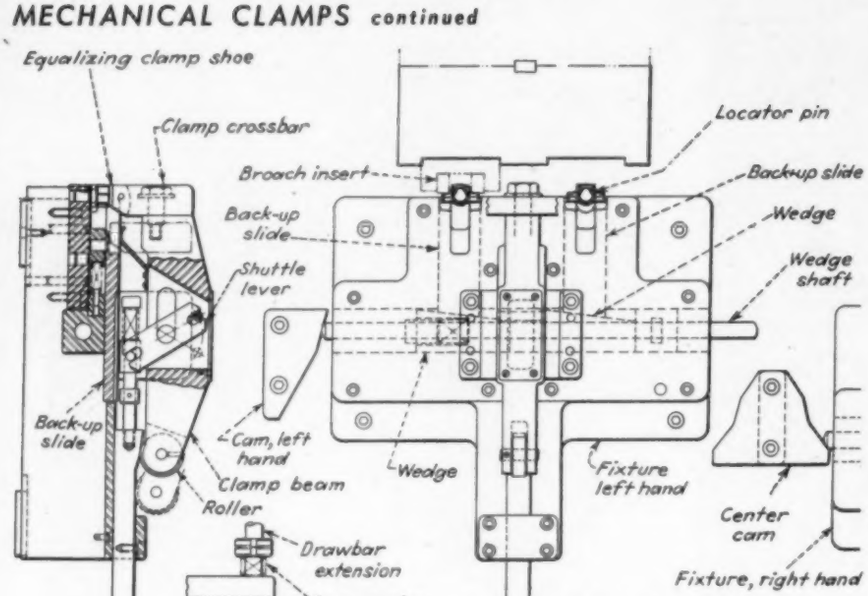
Developed by U.S. Broach Co. for use on a Colonial VAD double slide machine, this fixture employs spring-loaded drawbars on each side to raise jack pins to support work during operation. Center drawbar operates top and bottom cam plates through slotted lever to open and close horizontal locator pins which enter reamed holes in part



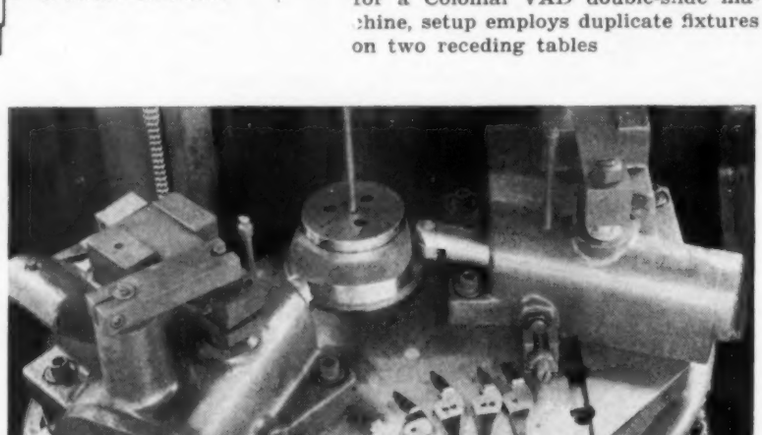
Rotation of a face cam serves to raise and lower clamp arm for holding parts in these fixtures on a Cincinnati 3/48 duplex Hydro-Broach. Hinged arm attached to bracket at side of machine serves to rotate cam as table swivels into and out of broaching position. Six surfaces are broached simultaneously on each part at 655 per hr. Cutting speed is 50 fpm.



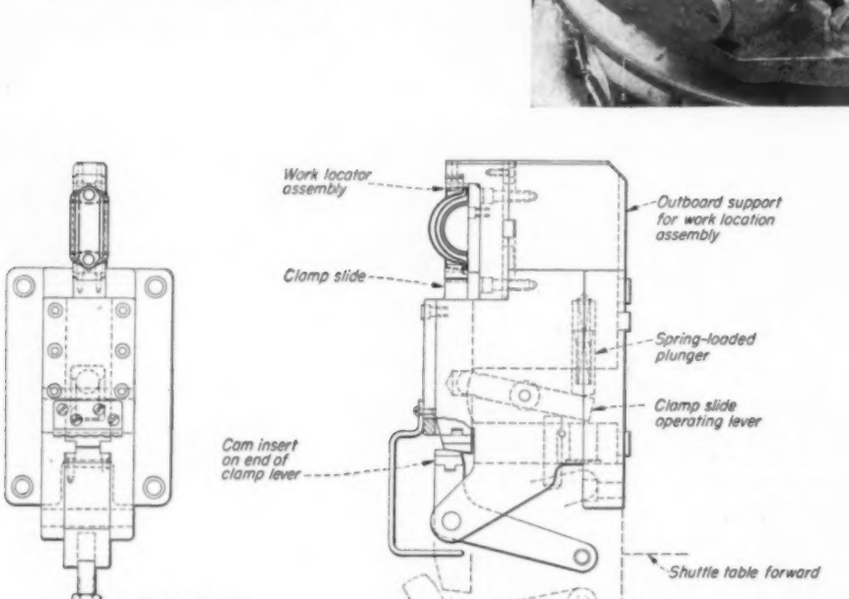
Universal, automatically clamped fixture has overhead clamp arm actuated by wedge block on end of a drawbar connected to apron on knee of Cincinnati 5/54 machine. Clamp arm moves back from over workpiece when table recedes. Lever at rear of fixture provides infeed for repetitive cuts when large amounts of stock must be removed. Interchangeable rest blocks and clamp bar ends are provided for machining various parts



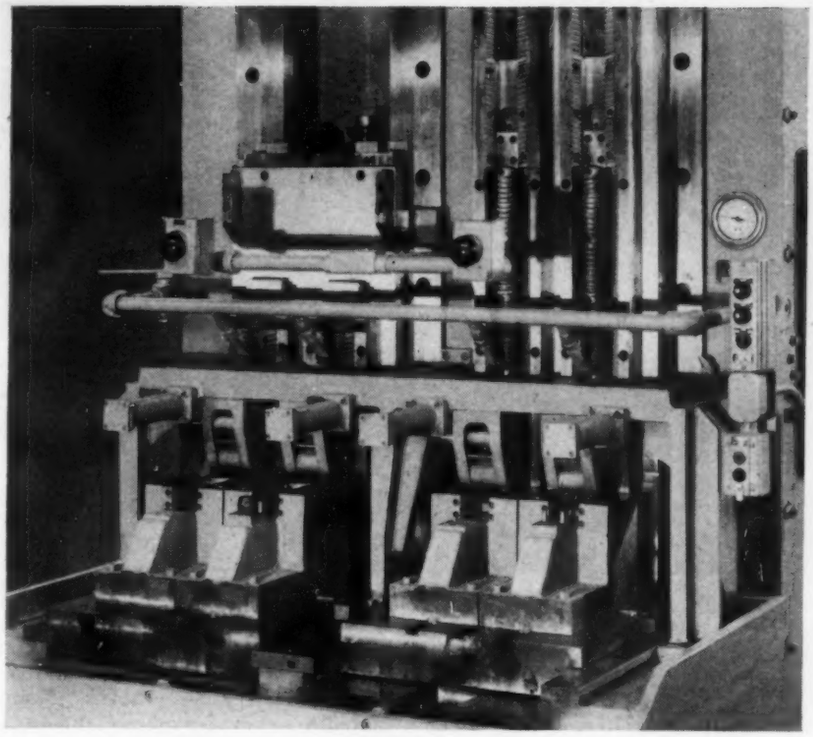
Spring-loaded wedge drawbar operates arm to clamp and unclamp part and also moves clamp arm back and forth to clear part for loading and unloading. Motion of shuttle table also carries wedge shafts across plate cams to move backup slides against rear of workpiece. Cross bar on clamp arm has equalizing clamp shoes to allow for variation in forgings. Developed for a Colonial VAD double-slide machine, setup employs duplicate fixtures on two receding tables

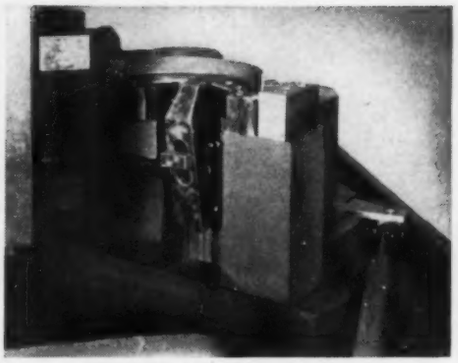


Cam on table pivot spindle of this Cincinnati 5/54 duplex Hydro-Broach operates spring-loaded plungers to control clamping and unclamping of plier halves. Work is clamped by wedge on plunger; cocking of plunger spring for unclamping is effected by swivel motion of table. Slip surface and shoulder are broached in right-hand fixture, jaw teeth in left-hand fixture. Clamp in latter is arranged for automatic retraction to facilitate loading



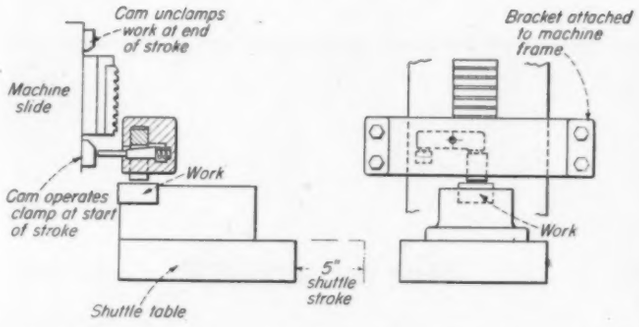
Automatic clamping and unclamping is accomplished by action of lever-type clamping cams actuated by movement of shuttle table. Top of clamp lever bears against horizontal clamp slide to clamp piece as table moves forward. On return stroke, clamp lever releases clamp slide and also releases pin which permits spring to operate lever inside fixture body and move clamp away from part. Designed by Detroit Broach Co., four of these fixtures, two on each table, will handle 1000 connecting rod caps per hr. on an Oilgear XD-10 double-slide machine





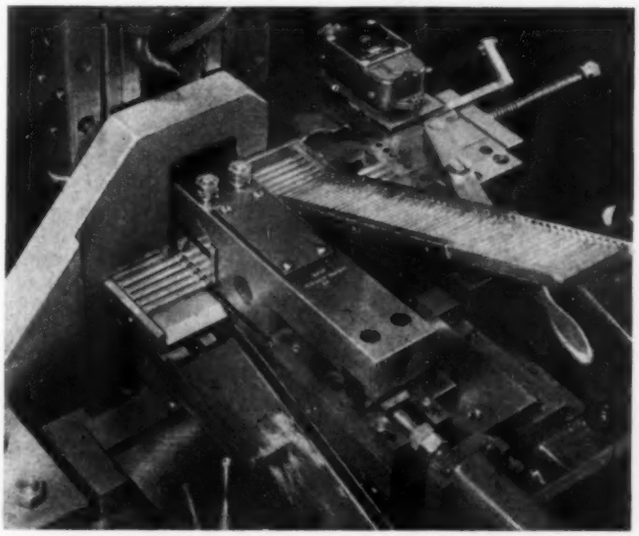
Jointed arm connected to bracket at side of machine turns cam to operate a drawbar and pull back a hinged vertical clamp for holding brake shoes. Two fixtures are mounted on a Cincinnati 5/42 duplex Hydro-Broach with swivel table

Duplicate sets of tools and fixtures are used on shuttle tables of an Oilgear XD-30 double slide machine for finishing half-round bores and joint faces of connecting rods and caps by removing 0.250 in. stock. Developed by Detroit Broach Co., fixtures use cams on top and bottom of each slide to actuate spring-loaded eccentrics in overarm for clamping



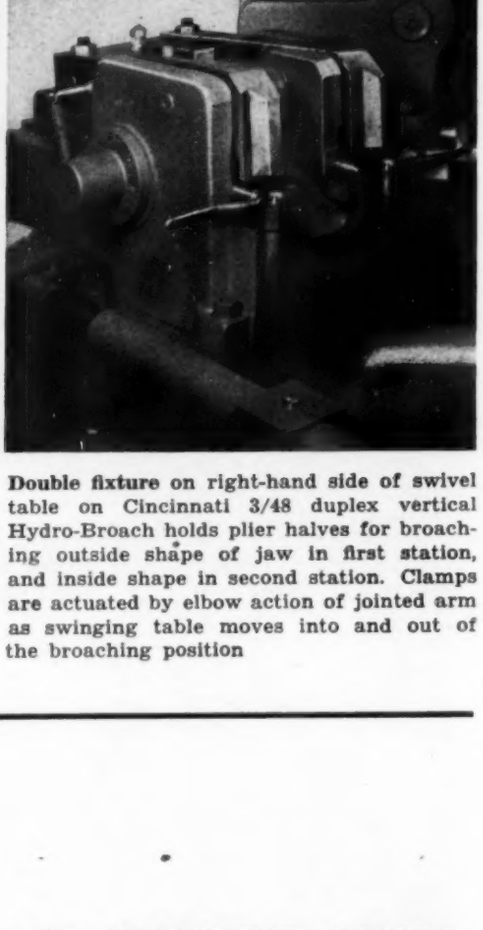
Simplified sketch showing operating mechanism for an Oilgear overarm type clamp actuated by spring-loaded wedges controlled by cams on vertical slide of broaching machine. This method of clamping leaves fixtures on shuttle table clear for easy removal and reloading of workpieces

Toggle joint connected to clamp arm and operated by spring-loaded drawbar is employed for automatic clamping and unclamping in this fixture for finishing the arc and two side surfaces of a rifle bolt. Part is located vertically over pin in front of fixture. Production is 200 an hr. on an Oilgear XS-6 vertical machine. For safety, all draw rods for fixtures of this type are covered with guards



Mechanical clamping fixture and manually operated loader is used when broaching both ends of five pins at each cycle of an Oilgear XS-6 machine. 1/32 in. max. is removed from each pin to a tolerance of ± 0.0002 in., eliminating grinding operation. Clamp is operated by wedge on spring-loaded drawbar. Five finished pins are pushed on to delivery plate at side of fixture when five new pins are loaded under clamp. Forward movement of table brings finished pins against stop on overarm, pushing them into delivery chute. Broaching cycle is automatic, and operator merely keeps chute filled and operates manual loader for each stroke

Mechanical linkage on these fixtures advances the overhead clamp over the workpiece as table swings into broaching position, and then moves the clamp down to secure the work. As the ram moves down to bring broach into contact with the work, the hinged yoke for positioning work moves down out of the way. Vertical pin on clamp operating arm moves clamp into and out of clamping position while this arm turns screw to move back end of clamp up or down. Machine is a Cincinnati vertical duplex Hydro-Broach

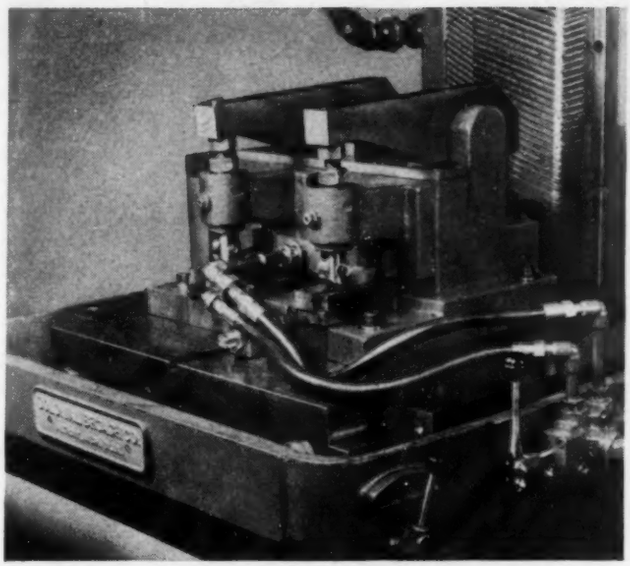


Double fixture on right-hand side of swivel table on Cincinnati 3/48 duplex vertical Hydro-Broach holds plier halves for broaching outside shape of jaw in first station, and inside shape in second station. Clamps are actuated by elbow action of jointed arm as swinging table moves into and out of the broaching position

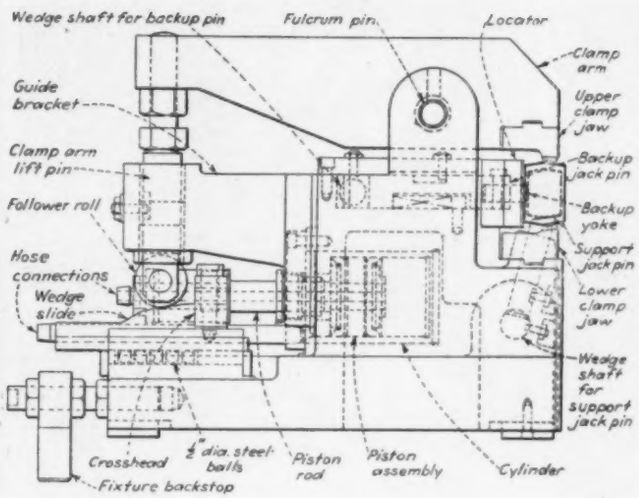
Shuttle Fixtures . . .

WITH AIR AND HYDRAULIC CLAMPS

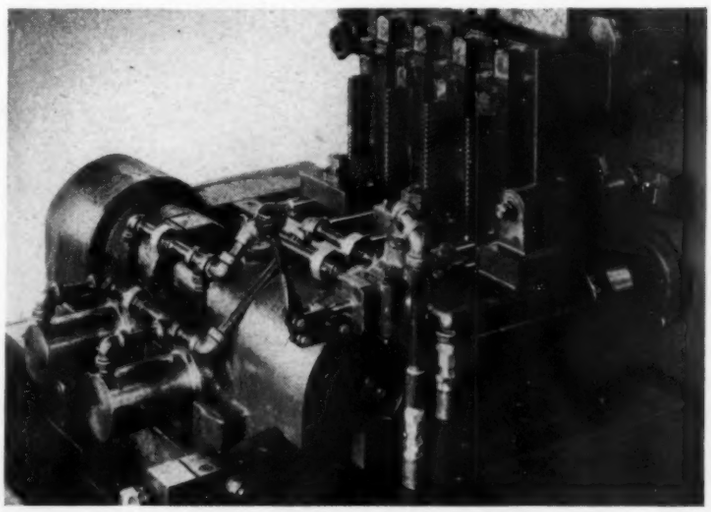
Clamp operating cams are rotated by hydraulic cylinders connected to main pump circuit on this Oilgear XD-20 double-slide machine. Spring-loaded fingers hold parts in place against back stops until clamps are locked by cams. Radial pins on cams move clamps on or off work as these are tightened or released. Made by U.S. Broach Co., each fixture is controlled by separate four-way valve. Electric interlock prevents shuttle table from moving forward and broach from moving down until clamps have locked and tripped limit switch



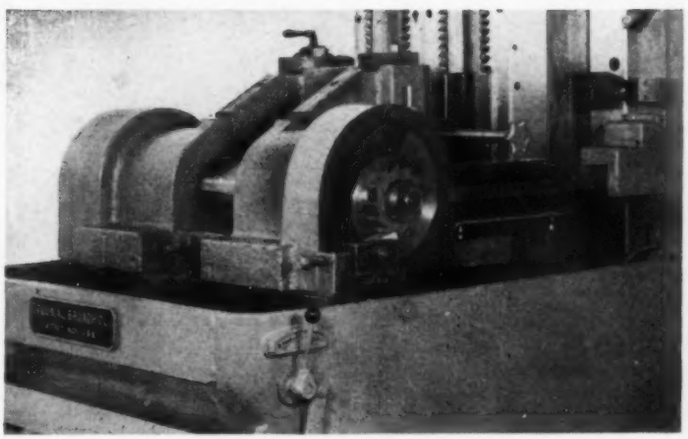
Double-clamp fixture uses one hydraulic cylinder to move wedges to operate clamps. Mounted on receding table of Colonial 10-ton single-ram machine, fixture was developed for broaching boss faces and sides of aircraft engine connecting rods. Details of construction are shown in accompanying sketch



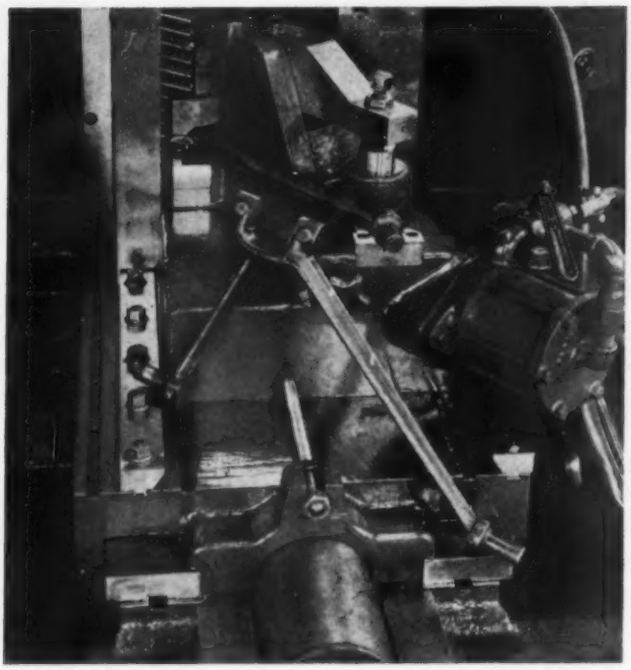
Double-edged serrated clamp jaws prevent workpiece from slipping or turning in fixture used for finishing connecting rods. About 3/16-in. stock is removed from one side and same fixture is used for removing same amount of stock from opposite side by merely changing locator. Hydraulic cylinder maintains constant pressure against clamp actuating rolls throughout broaching cycle



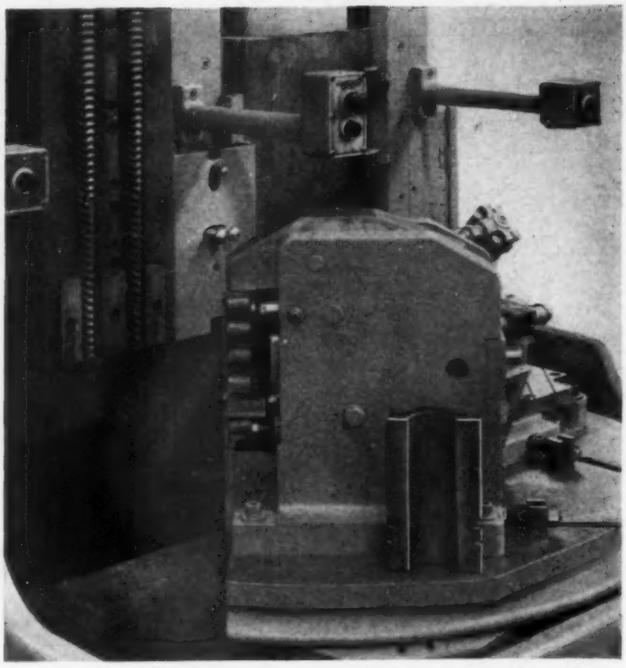
Automatic cycle operation and hydraulic clamping is used in this fixture for slotting ends of four shafts at a time. Each hydraulic cylinder operates equalizing jaws to hold two parts, and two cuts are taken without moving parts in fixture. After first part of cut, table moves back, tripping ratchet wheel to turn cam controlling forward movement of table. Table then moves forward into finishing position and second section of broach cuts slot to full depth and shaves sides to size



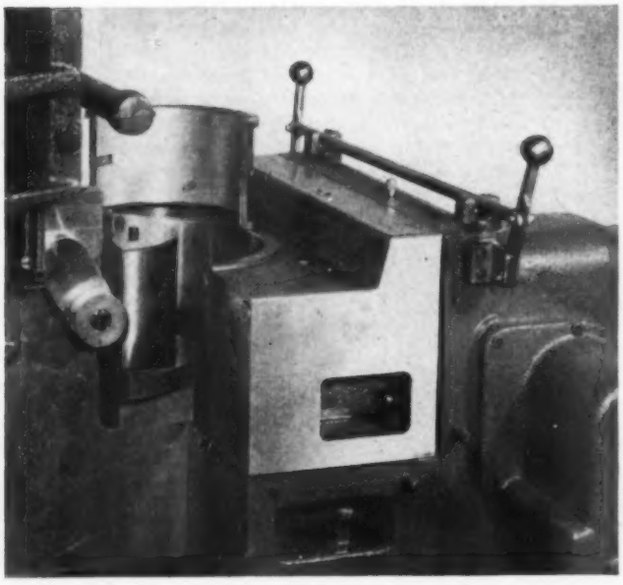
Progressive feed-in fixture for automatically cutting slots to excessive depth on a single slide Colonial machine. Depth control cams have 12 lobes, each of increasing radius. As hydraulically controlled shuttle table moves back, ratchet is tripped one tooth to present fresh cam lobe to depth-control stop. After twelfth and final cut, during which the fixture rests against a positive stop, the cam rotates to the minimum depth position for the first cut on the next part



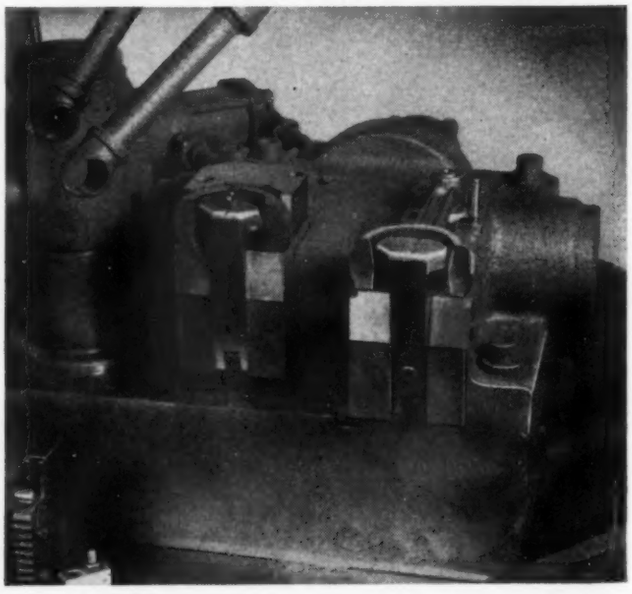
Air-actuated fixture on Cincinnati 5/54 single-ram machine for finishing inside boss faces on steering-knuckle support arms. Part is located on hardened inserts, and is held in position by a toe clamp actuated by a sliding wedge connected to air-cylinder piston. Movement of receding table back from the broaching position for the return of the ram provides room for unloading and reloading parts in the fixture



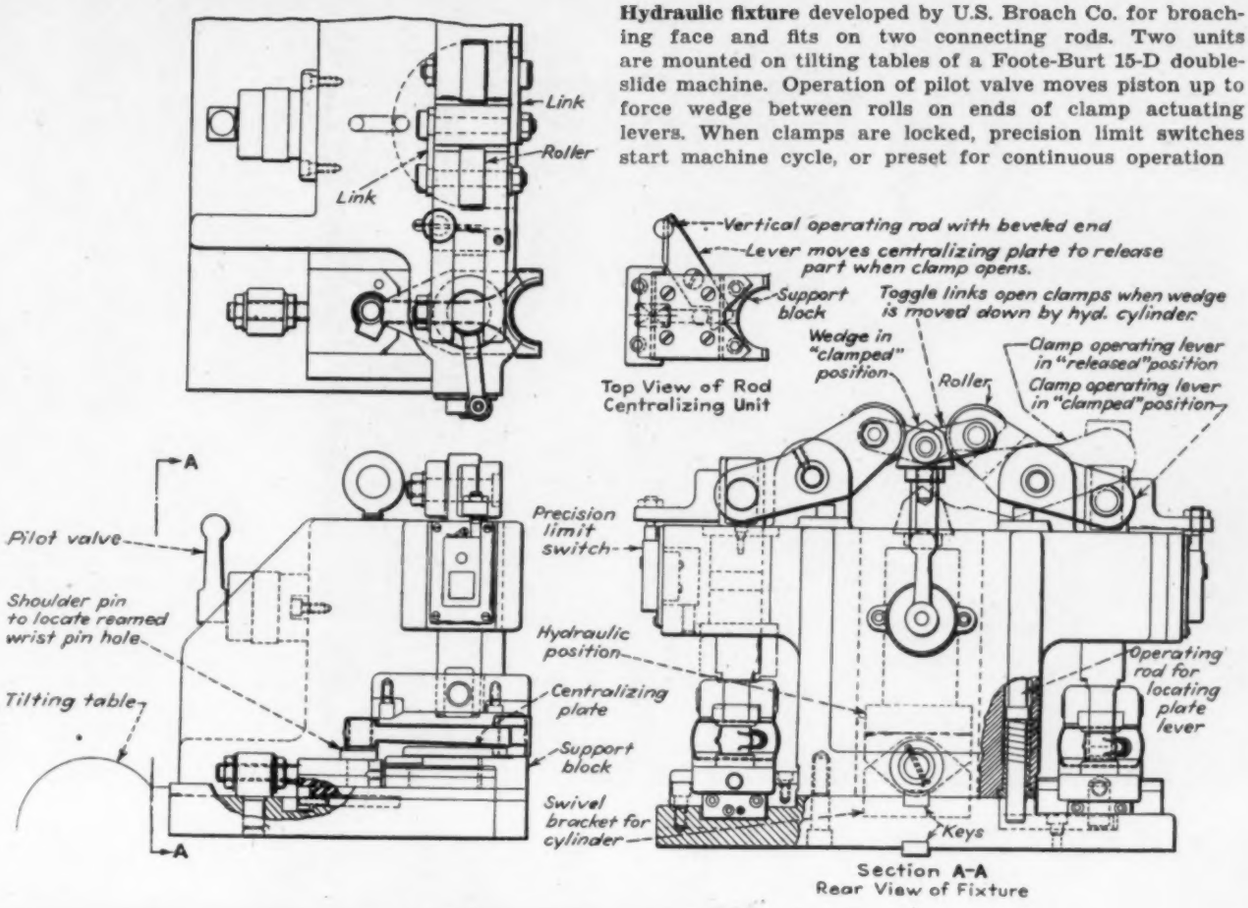
Upper and lower clamp arms of this hydraulically operated fixture pull workpiece back against four support studs when cylinder is automatically actuated by table swinging into broaching position. Hooks on clamp arms contact casting in rough half-round bore. Upper clamp is slotted so it moves forward and up to provide room for loading. Operation consists of finishing parting faces of cast-iron bearing-cap castings on a Cincinnati 10/66 duplex vertical Hydro-Broach



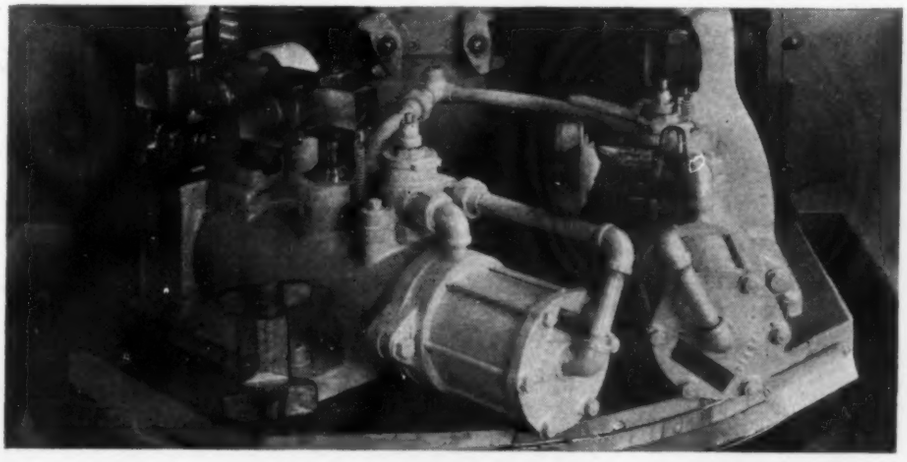
Centering rolls on each side of clamp head locate parts radially during clamping and move back to clear broaches when table moves forward into cutting position. Clamp is made up of two accurate clamp units and a spreading wedge operated by a hydraulic cylinder to apply up to 15,000 lb. pressure when seating part in fixture nest. Clamp head and nest are interchangeable for bearing liners 3½ to 8½-in. dia. Parts are babbitted bearing liners faced on joint surfaces in a 10-ton Foote-Burt machine



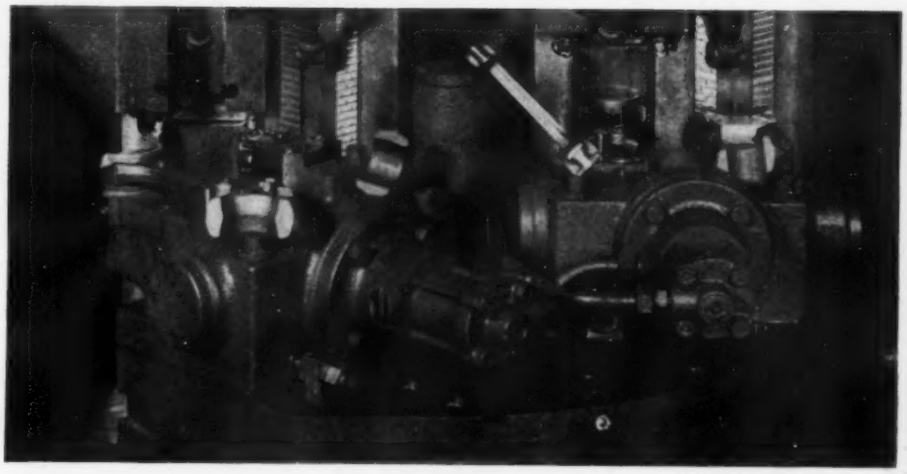
Hydraulic cylinders moving wedges are employed in this fixture for clamping a connecting rod and a cap when broaching parting face. Vertical clamps hold forgings by pressure against rough bore, and power is taken from main drive pump circuit before delivery into control valve to assure constant operating pressure of 135 psi. Two fixtures are mounted on swivel table of a Cincinnati 5/54 duplex Hydro-Broach, and production is 325 pairs (650 individual parts) per 52-min.. hour



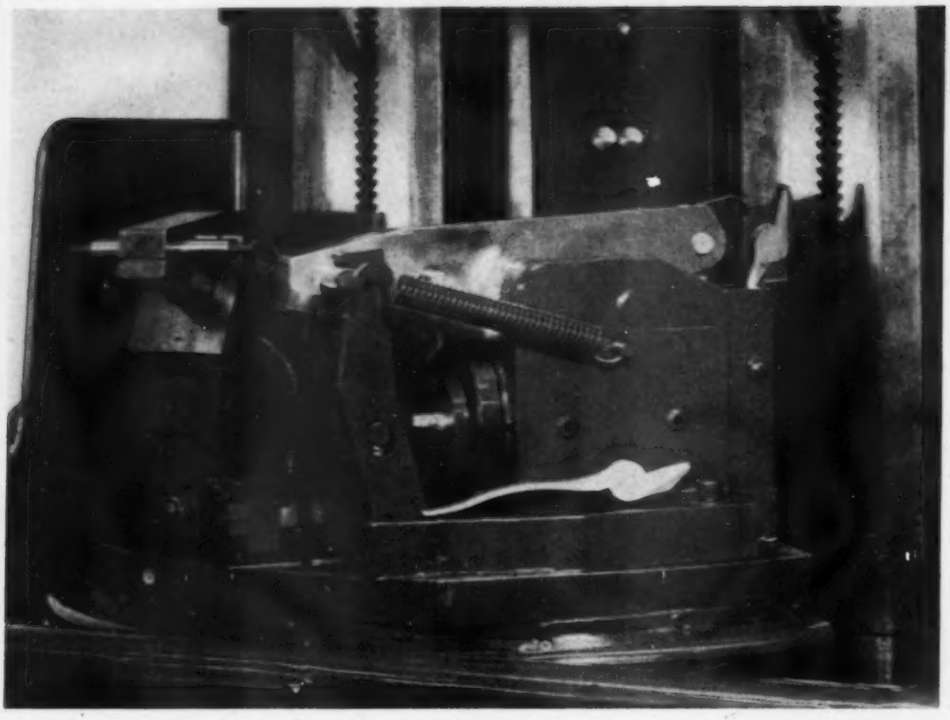
Hydraulic fixture developed by U.S. Broach Co. for broaching face and fits on two connecting rods. Two units are mounted on tilting tables of a Foote-Burt 15-D double-slide machine. Operation of pilot valve moves piston up to force wedge between rolls on ends of clamp actuating levers. When clamps are locked, precision limit switches start machine cycle, or preset for continuous operation



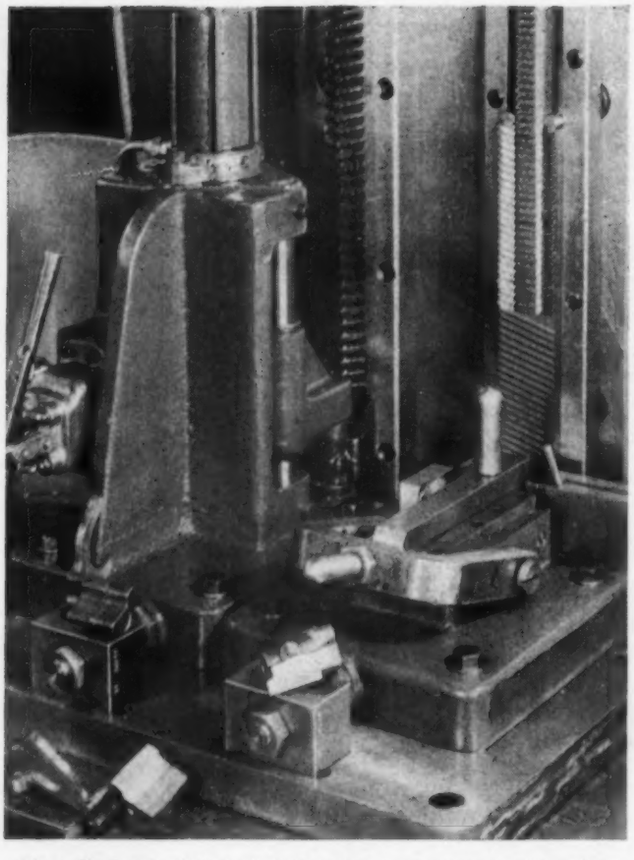
Two duplicate air-clamped fixtures are mounted on swiveling table of a Cincinnati 10/66 Hydro-Broach for broaching the inside and outside yoke bosses of steering knuckles. Workpiece is located from rough stem and previously broached edges of lugs. Clamp arm is moved by vertical spring-loaded plunger actuated by wedge on piston rod of air cylinder



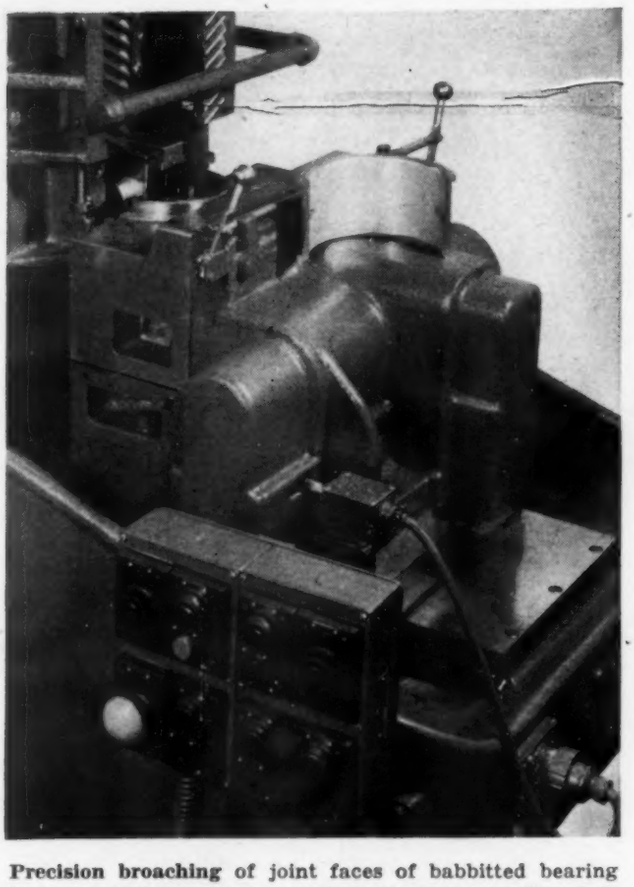
Presetting electrical control circuit by pressing proper dual safety start buttons after reloading, will cause this machine to repeat on automatic cycle. Hydraulically clamped fixtures each hold a connecting rod and a cap forging for facing parting faces and fit dimensions. Production is 650 parts per 52-min. hour on a Cincinnati Hydro-Broach. Ram speed is 32 fpm.



Straddle broaching of plier sections is performed in this setup on a Cincinnati 5/54 duplex Hydro-Broach. Duplicate hydraulic fixtures are mounted on swiveling table and clamp operation is timed with the swivel motion so clamp is closed as table moves into broaching position



Air cylinder built into left-hand fixture gives rapid action to long travel of clamp head necessary when locating shifter fork for broaching L-shaped faces. Loading would be too slow with hand clamps, and mechanical clamping would be complicated. On right-hand fixture, a flat surface and radius are broached, and a simple hand-operated clamp is satisfactory. Mounted on a Colonial single-ram machine, fixtures give 180 pieces per hr.



Precision broaching of joint faces of babbitted bearing liners for Diesel engine crankshafts is accomplished in this hydraulic fixture developed for use on a 10-ton, 54-in. stroke Foote-Burt single slide vertical machine. Clamp slide is moved by wedge on piston of transverse hydraulic cylinder and is designed to insure application of even pressure over entire area of liner bore when workpiece is clamped for broaching joint faces

"The fate of the world sits on this rug"

– JOHN L. LEWIS

NOTE: Paste this editorial in your hat. Re-read it as you start to shiver the next time John L. Lewis cuts off the nation's coal supply.

"Labor monopoly" will mean much more to you then. But if you are worried enough you will get after your Congressman to do his part now — before the shivering starts.

★ ★ ★

"The fate of the world sits on this rug."

The men on the rug: John L. Lewis, President of the United Mine Workers, who made the remark; Benjamin Fairless, President, United States Steel Corporation; George M. Humphrey, Chairman, Pittsburgh Consolidation Coal Company; Harry M. Moses, President, H. C. Frick Coke Company; Charles O'Neill, President, United Eastern Coal Sales Corporation; the late John O'Leary, International Vice President of the United Mine Workers; and John Owens, President, District No. 6 United Mine Workers.

The place: Room 800, Carlton Hotel, Washington, D. C.

The time: Last July during the "negotiation" of a new soft coal contract.

The outcome: Another whopping increase in wages and the price of coal, another hike in the cost of living, and a "contract" which binds the United Mine Workers only as long as they are "willing and able to work."

Mr. Lewis was right. The fate of the world did sit on the rug. In fact, it sat at Mr. Lewis' feet, for, as this editorial will explain and as the outcome shows, his power over coal is absolute.

Without coal modern industrial civilization collapses. Without Mr. Lewis' assent coal can not be mined. He has the nation and, in the years 1947-48, the world at his mercy.

The Taft-Hartley Act, good as it is, does nothing to check this kind of monopoly.

I

The Taft-Hartley Act fails to protect the public in many major particulars.

Here are some of them.

1. Labor monopoly is promoted and protected by its continued exemption from the federal antitrust laws. Management has no such exemption and should not have.

2. Industry-wide bargaining, a kind of second-degree monopoly, is left virtually undisturbed. So is union-wide bargaining which extends the power of national unions far beyond a single industry.

3. Featherbedding, the art of getting paid for doing nothing, is left largely intact.

4. The menace of having local utility strikes wreck the health and safety of a community is left untouched. Postponement and persuasion are the only instruments provided to deal with strikes that would wreck the nation.

My purpose in citing these omissions from the Taft-Hartley Act is not to belittle the act or its framers. They did a most courageous and constructive job. They made a real start toward restoring a workable balance in industrial relations in the United States, so far as the law can do it. But they have not completed the job. Among their omissions the two discussed in the next sections of this editorial stand out above all others.

II

The most serious Taft-Hartley shortcoming is its failure to deal with labor monopoly.

Labor monopoly exists wherever a union is so strong that bargaining becomes a sham and the union virtually dictates its own terms.

If an employer or group of employers secures a monopoly or anything approaching a monopoly, prosecution for violation of the federal antitrust laws

is in order. That is as it should be, for monopoly means death to economic and political freedom.

But if a labor union secures complete monopoly control over an industry through control of its workers, that union remains above and beyond the antitrust laws. "The fate of the world sits on this rug." By that imperial attitude John L. Lewis fully demonstrated how obsolete is the notion that labor unions are weak and, therefore, need exemption from the antitrust laws. Through the United Mine Workers, Mr. Lewis controls about 90% of the coal miners. (No company controls more than 5% of the nation's coal output.) Wherever he sits he has at his feet the welfare of the whole nation.

Great international unions exercise a comparable measure of monopoly control in other basic industries – steel, transportation, and automobiles, for example.

These labor monopolies can destroy the nation if they are not themselves broken up. Witness the plight of France. There the Communists have found in the great labor monopolies an instrument for shaking the nation to its foundations.

III

The Taft-Hartley Act also leaves untouched industry-wide collective bargaining, which is a kind of second-degree monopoly.

When all or almost all of the employers in an industry get together with the union leaders to agree on wages and working conditions (that is called industry-wide bargaining) they set up a monopoly control. It is a less concentrated monopoly than when the terms are dictated by either side, as Lewis dictates them in coal. But, nonetheless, competition is eliminated and monopoly control is established over wages, which are by far the largest element in the cost of production. It follows that public regulation of collective bargaining — *which means the end of free unions and free management* — is not far behind.

Some employers defend industry-wide bargaining as their only defense against industry-wide unions. Other employers like it because it makes wages and hours uniform for their whole industry.

For those employers who are forced into industry-wide bargaining in self-defense the road to relief is clear. Congress owes it to them and to the public to free them from the necessity of dealing with a monopolistic union. The best way to do that is to remove the exemption of labor unions from the federal antitrust laws.

To those employers who engage in industry-wide bargaining because they like it the proper answer is also quite clear. They (and the union involved) are maintaining a private monopoly which is offensive to the public interest. It should be prevented by law.

IV

Congress should finish the job of eliminating labor monopoly and industry-wide bargaining.

In the course of enacting the Taft-Hartley law last spring the House acted to eliminate the exemption of unions from the federal antitrust laws and to make industry-wide bargaining illegal. The Senate, however, refused to go along.

The principal reason advanced in the Senate for deferring action was that more knowledge is required to legislate intelligently. To get the needed information, a joint Congressional committee was created.

It is standard Congressional practice to stall off tackling a difficult job by creating a special committee to study it. The new joint committee is not likely to prove an exception to this rule — *unless the voters loudly demand of Congress that it get on with its job of protecting the public interest in the conduct of labor relations — a job which is nowhere near done.*

Helpful and effective as many of its provisions are, the Taft-Hartley Act does not face squarely the central principle of industrial relations in a free society. That principle is this: *Neither employers nor organized workers, separately or in combination, shall exploit the public by establishing a monopoly.*

Do not let your Congressmen go to sleep on the job of solving that problem or hide from it because of fear. The perfect solution may be hard to find. But the problem can be largely solved by making organized labor subject to the federal antitrust laws just as management is now subject to them. If that problem goes by default your children and your grandchildren will really know what slave labor means.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

TALKING SHOP

Own Medicine

Willys-Overland uses Jeeps, not only for taxi service for visitors, but also for tractor hauling in its plant. Maneuverability of the little cars makes it possible actually to drive visitors through factory aisles. Another case in which the doctor takes his own medicine.

Away From It All

Air-conditioned conference rooms complete with telephone are available for visitors just off the lobby at Heald Machine Co. An excellent idea—avoids the necessity of policing your desk every time a visitor is announced and skips the dozens of little interruptions that hamper every conference if you don't have a secretary or some other defense against the "home folks" looking for a paper clip or a lost blueprint.

Shared Know-How

A letter from Henry Peterson, president and chief engineer of Lepel High-Frequency Labs., to ASTE members, makes an important point: ". . . more often than not, these (tool) engineers (of metalworking companies) had devoted a good deal of their time and effort experimenting with high-frequency heating problems which had long since been solved by our engineers. . . ." That goes for any kind of problem—it's wasted time to struggle over something the specialist has already done. If you do it, you're not being smart; and if he isn't willing to pass it on as part of his engineering service, he's not being smart. Mr. Peterson is willing—and smart. Are you?

Business for Fun

PRES. RAY B. TRIPP tossed in this jingle as a part of his opening remarks at the recent AGMA meeting: "Count that day lost whose low descending sun, finds costs shot to Hell and business done for fun." It could well be posted in many cost and production departments, and not only in gear plants.

Perishable Package

Conveyors and other mechanical-handling aids are now regarded as perishable tools by one manufacturer. Every modernization project is considered in all aspects: machines, tooling, and handling adjuncts. Minimum machining costs and some surprising cost cuts result. It's important to realize that getting material to machines and finished work away is today at least as important as machining.

Rejection Blues

SUGGESTION PROGRAMS have proved a boon, often turning up savings overlooked by harried management. But picture the plight of one company faced with a lawsuit: This firm (one that has made a notable success of the suggestion program) turned down a proposed change. A few months later, top management, not knowing of the suggestion, instituted this change. The worker now refuses an award, has figures he claims show substantial savings, wants his share. . . . As the backlog of rejected suggestions grows, the chance of this type of trouble also grows. Some method of checking, if it were practical, would save embarrassment and expense.

Too Late

"YOU CANNOT inspect quality into gears" reads a sign in the Westinghouse inspection department. Nor into anything else. Quality starts in steel mill and foundry. No matter how you polish it, bad steel is bad.

Chrome Plate

TOP RINGS for trucks and buses may soon be chrome-plated. These rings cost three to four times as much as regular ones, but last twice as long, thus cutting oil waste and costly teardowns. Chrome-plating is also being used on compressor and rock-drill parts to increase wear.

Balanced Unbalance

TURRET-LATHE time charges during the war of $2.20 per hour by one contract shop were found far too low, according to the shop owner, discussing AGMA statistics at the recent semi-annual meeting. OPA control made higher rates impossible—but the shop made money because the markup on materials was too high! Actual value of turret-lathe time was found to be nearer $4.20 per hour, so the two rates have since been adjusted.

Other plants in the vicinity made similar studies—found that they also were doing a big business in turret-lathe work at bad prices. Reminds us of the old wheeze of the storekeeper congratulating himself at a cut-price sale: "I lose a little on every sale, but look at the business I'm doing!"

IF YOUR SWEATER IS TOO BIG FOR YOU-WATCH OUT FOR THE MACHINES!
If you are too big for your sweater WATCH OUT FOR THE MACHINISTS!

ROUND TABLE

Is Too Good Too Bad?

"Ed, you really spend good money on your men, don't you? I see where Doc Lawrence is getting another platform. With the cost of lumber what it is today, your favorite lathe operator certainly represents quite an investment!"

"Yeah? Well, it so happens that the flooring around Doc's machine needs replacing. What's the matter with that? If the floor wears out, I have to put a new one in, no matter who works there."

"But that's just what I'm shooting at. It's no longer a case of who works where. The boys tell me that this new hard wood that's going down makes the fifth floor that Lawrence will have had under him. Some record—five floors and two machines. You must love that Lawrence to keep him on the same job all these years."

"Al, quit trying to be smart. Maybe Lawrence loves that lathe. And what difference does it make if he has been on the same work as long as he wants to be?"

"Wants to be, *nuts*. If he were halfway smart, he would have been some kind of a supervisor by now. All through the depression, the war, retooling, and everything else, and still just a toolmaker. Why don't you give your men a break and promote them once in awhile? Doc's been stuck for so long now he wouldn't be any good to anyone if he were transferred or promoted. You can take it from me: None of my men will ever wear out more than one platform!"

"You and your ideas! If I shifted these boys around the way you do, I wouldn't have a department in six months. My men are skilled, Al, and when a good one comes along, I've got to hold him. You know that. I run a toolroom, not a production department."

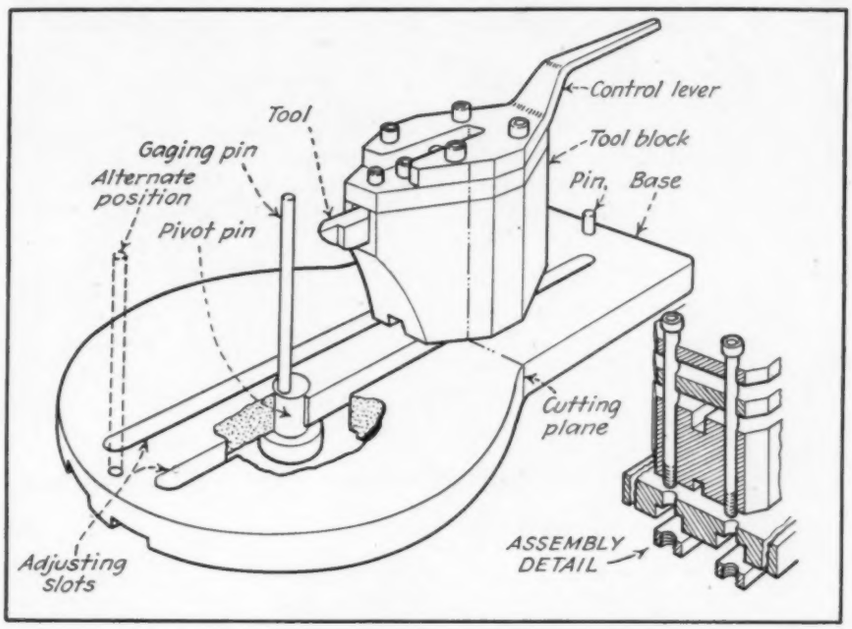
"Then, what you're telling me is that the way to get ahead is to be a bum. Let the boss know you're no good, and keep getting moved around 'till you find exactly what you want. We might even go so far some day that our policy will be to make supervisors out of the operators who can't make the grade. Don't be silly; give your men a chance!"

"Al, do a little thinking before giving so much free advice. I'm paid to take care of the company's interests, not the personal welfare of every individual in here. My men like to be left alone anyway. And your talk just doesn't register with me. All my people either do a good job or they don't work here."

"We have a hard time getting our thinking together, but listen a minute. You can still take good care of the company and not be so selfish about Lawrence. In fact, how can you give the company a break without giving the people in it a break?"

***WHICH SHOULD COME FIRST**—man or company? Does holding a man harm him or help him? Have you felt you were held back because you did too well what you were doing? Others can profit by your experience and ideas. Discussions of earlier topics appear on later pages.*

Practical Ideas



Spherical-Turning Lathe Tool Cuts Precision Ball and Socket Elements

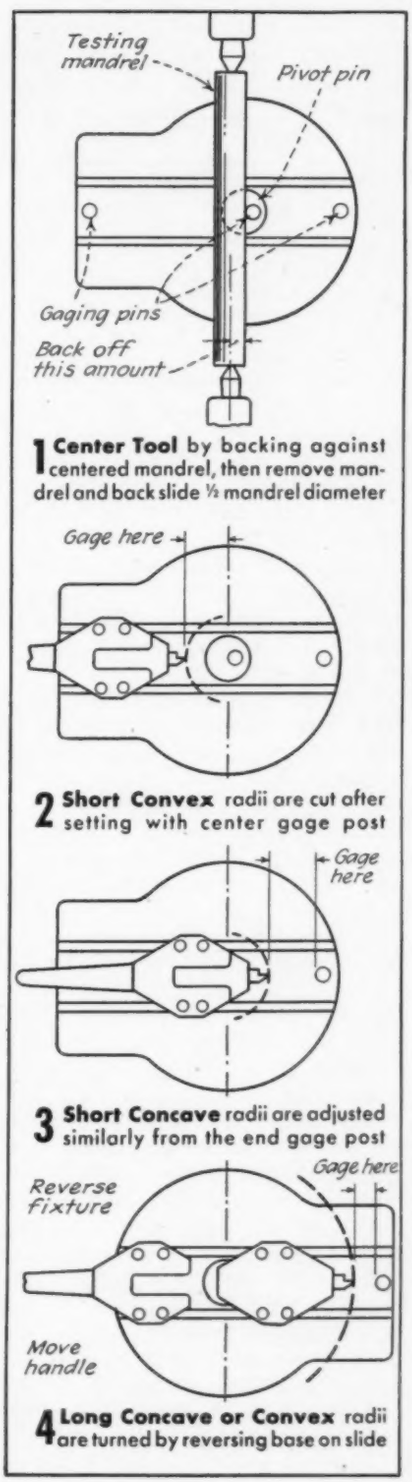
Most ball-turning fixtures are made up to suit one specific job, and usually when time is limited. For these reasons, they often lack adjustability, and more important, accuracy. This fixture was built for a ball and socket job, requiring convex and concave cutting, and accuracy was important so unusual care was taken in its construction.

The fixture base is made to the dimensions of the lathe compound rest it is to replace, and should fit nicely over the compound pivot pin. A 3/16-in. hole is carefully drilled and reamed exactly 3/32 in. from the pivot center and along the cross-slide centerline. This hole must be truly perpendicular as well for it is to hold a 3-in. gaging rod used in centering the fixture and adjusting tool radius. The base carries two more gage-pin holes at opposite ends of the centerline, some unit distance from the pivot for use when the central pin is covered by tool block.

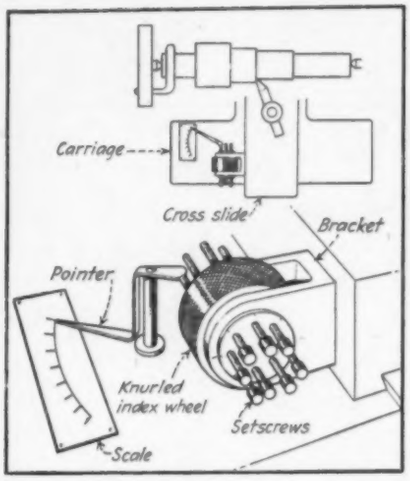
Slots are provided for radius adjustment with counter slots to recess the rectangular nut plates.

A lathe mandrel between centers transfers the spindle axis to the tool using the 3-in. central gage pin. After setting, the cross slide is carefully backed to compensate for mandrel radius, of course. Any of the gage-pin positions may be used in setting the tool block, depending on the type of cut and approximate radius. Calipers between gage pin and toolbit give the exact radius or the radius plus or minus a fixed unit dimension.

Long radii, either convex or concave, are cut more conveniently by reversing the tool block on the base, and then swinging the base to the appropriate position. The handle can be removed and mounted separately whenever the tool block position places the handle over the pivot and reduces leverage. *Allen B. Nixon, Springfield, Mass.*


Testing mandrel
Pivot pin
Gaging pins
Back off this amount
1 Center Tool by backing against centered mandrel, then remove mandrel and back slide ½ mandrel diameter
Gage here
2 Short Convex radii are cut after setting with center gage post
Gage here
3 Short Concave radii are adjusted similarly from the end gage post
Gage here
Reverse Fixture
Move handle
4 Long Concave or Convex radii are turned by reversing base on slide

Indicator Attachment Sets Rough and Finish Diameters



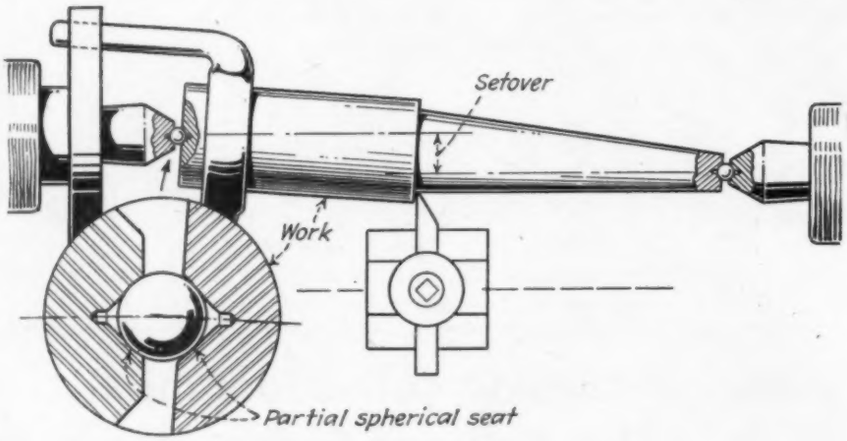
Multiple-diameter or stepped shafts ordinarily require a lot of fussing and checking, especially when the work is large and can't be done in an automatic lathe. Here is an easily installed device which will duplicate any number of different diameters indefinitely after the initial setting is made, and it provides for a roughing cut as well.

A thick disk or spool carrying eight or more longitudinal setscrews arranged near the periphery is mounted on a shaft on one side of the lathe cross slide by means of a suitable U-bracket. A standard dial indicator, or a specially made indicator is then mounted on the carriage saddle so it will bear against one of the setscrews projecting from the rotatable spool. Each of these screws is set with the aid of a finished piece of work or a master, so the dial gage will read zero when the cross slide is in the proper position.

With the master in place between centers, the dial gage is adjusted to read zero with the No. 1 setscrew in contact with its button, and the tool is brought into contact with the first step on the shaft using the compound rest. This operation has almost unlimited flexibility because of the many different adjustment combinations that are possible. Now, however, the dial gage and the compound rest must remain fixed. The next step is adjusted with the cross feed screw until the tool is in contact. Then the cylinder-spool is rotated one step and the second setscrew adjusted to bring the dial pointer back to zero. Subsequent steps are adjusted in the same fashion.

Roughing cuts can be made as light as desired simply by bringing in the cross feed two or three thousandths short of the zero mark on the dial. As zero always indicates the final size, no dimensions have to be remembered, and regardless of the range of diameter differences, the indicator only requires a few thousandths travel because the setscrews do the rest. All the operator has to do is to keep the cylinder position straight with reference to the particular step he is turning.

Actually, the dial indicator isn't necessary. A very accurate leverage pointer can be permanently pinned to the saddle, ready for use as required. Two or three marks, showing the zero and a couple of roughing-cut allowances, can be scribed on a small plate screwed to the saddle. This indicator takes up less space, is less expensive and doesn't tie up a dial gage. *T. H. Hanley, Cincinnati, Ohio.*

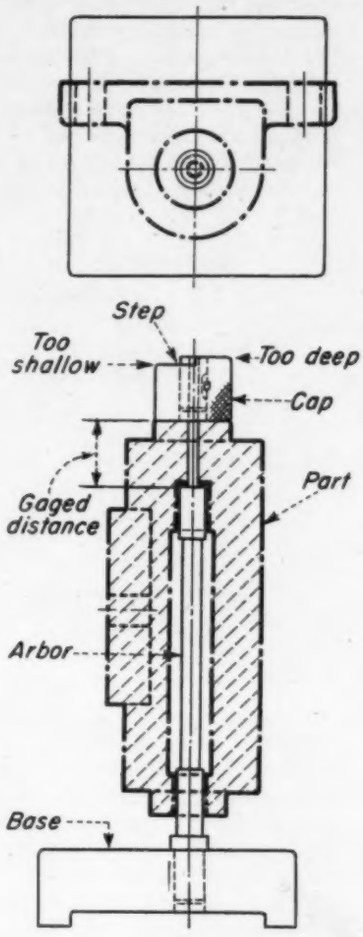


Steel Balls as Centers Improve Offset Tailstock Taper Turning

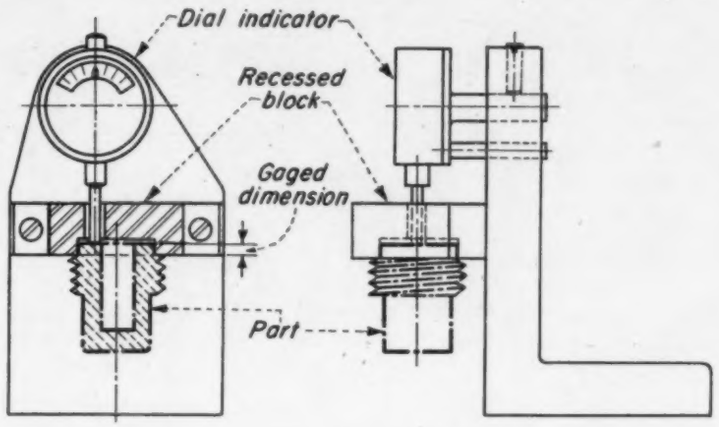
When the tailstock is moved over a certain amount to cut a taper, the work has to be cocked on the two 60° center points. Under some circumstances, this does no particular harm, especially if a ball-bearing tailstock center is available, for then there will be no sliding friction. But even then, the female centers in the piece will make a very poor fit on the machine centers, and the only approximation which would be at all satisfactory would be a curved center.

A very simple method of improving this kind of setup is the use of female centers in the machine as well as on the piece, and steel balls as universal connectors. As work of this nature is not too frequently encountered, it would not be worth the trouble to make up taper-shank female machine centers, but ordinary drillrod pieces, with one end countersunk, will serve as well, using drill chucks to hold them in the machine.

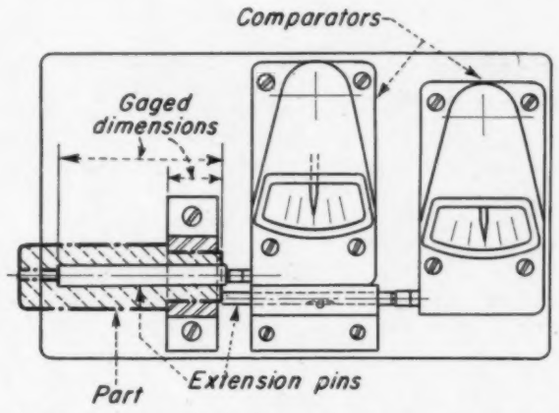
After placing the drillrod centers in the lathe, place steel balls of suitable diameter in the conical ends using very stiff grease to prevent them from dropping out until the work is in position. If the work is soft material, the balls will form a slightly spherical seat, especially if the taper is fairly steep, but this won't damage the centers for subsequent conventional centering. Further, the balls simplify greatly the problem of measuring tailstock setover accurately. *A. F. Wyleta, Jr., Chicago, Illinois.*



1 Counterbore-to-end distance is checked with a step-cut knurled ring indicating against an arbor which holds the piece in position



2 Pilot depth is measured by placing part in a recessed block so its face will bear against the stem of a dial indicator. Recessed block and indicator are rigidly held in fixed alignment with an angle plate



3 Hole depth and neck length are simultaneously gaged with a similar instrument. Part shoulders against a fixed block so one gage checks the end face while the other reaches to the bottom of the hole. Extension pins transfer the indications and both gages should be adjustable

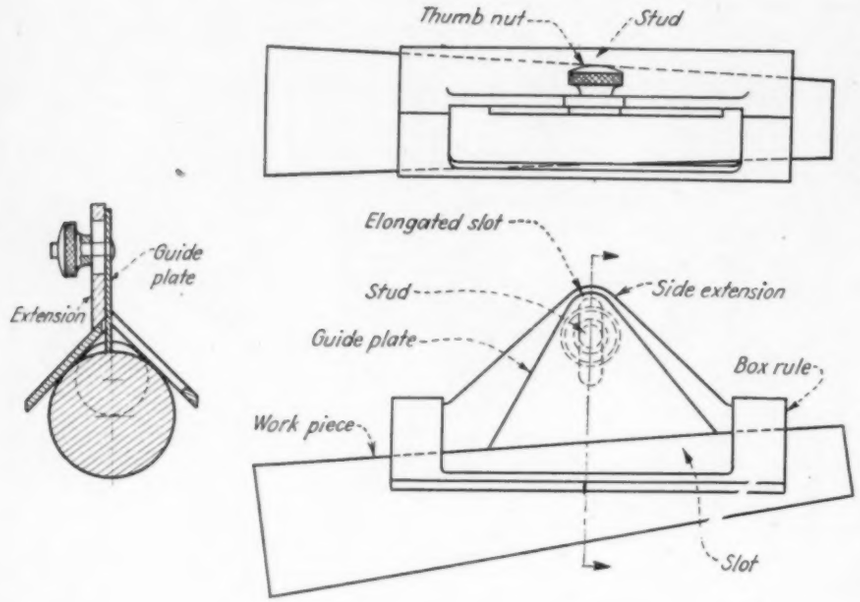
Inspect Parts Speedily With Gages Like These

Production inspection is based on gages where the parts are quickly placed in a fixture and the indication is there immediately. No absolute measuring is done; readings are comparisons with a master, and the gages have been adjusted to show the limits of acceptability, i.e. too big, too small, and within the desired range.

The flush-pin gage, shown in Fig. 1, is effective. Here the part is placed over a fixed vertical arbor so the inside counterbore rests on the step on the arbor. Arbor diameters should be just enough undersize to take all parts easily without undue looseness. With the part in place the stepped collar is placed on top. Arbor projection and collar thickness, and the step thickness have been precalculated so: pin comes flush with top step at minimum dimension and flush with lower step at maximum dimension, and between the steps the part is acceptable.

Dial-type comparators have similar applications but differ by giving a more quantitative reading. Limits are usually marked in red on the dial. Figs. 2 and 3 are examples of dial gaging in production, serving to illustrate the method. In both, the part is placed against and into a locater, and held there momentarily, depressing the spring plunger and moving the pointer(s).

All these gages involve relative movement, and where speed and accuracy requirements are both high, eye strain is severe because the limits are not indicated with sufficient absoluteness. In such cases, gage design is carried one step further, and electric switches are added to ring bells and light lights to indicate parts not within limits. *F. Hartley, Pawtucket, R. I.*

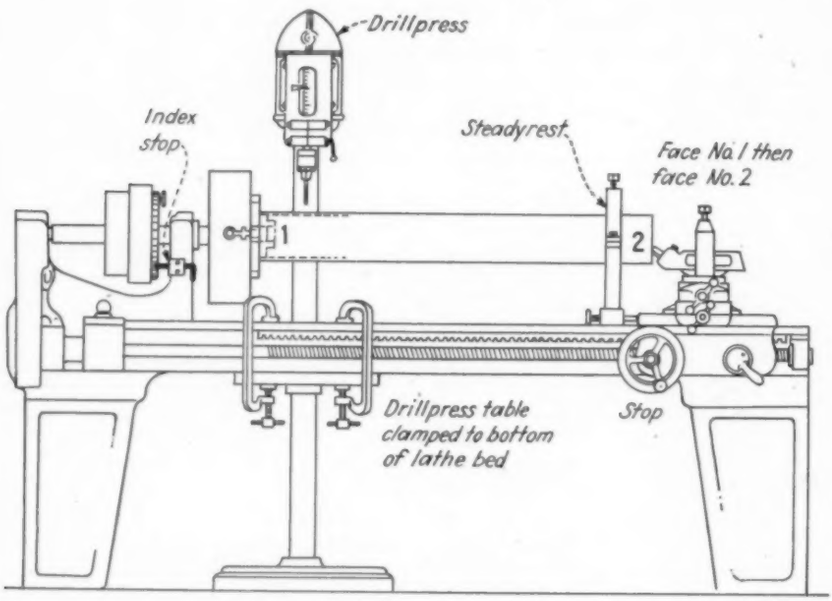


Centering Device Locates Keyways On Tapered Shafts

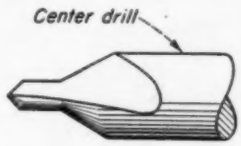
Axial slots on tapered shafts can be a particularly annoying layout problem. This tool, consisting of a long V-block with a bisecting plate extension and a pivoted guide plate, makes the job easy.

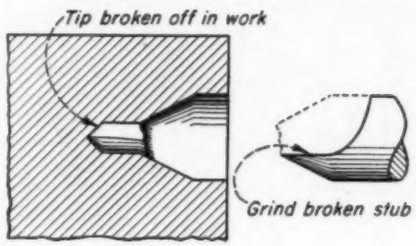
A standard box rule is generously slotted on one side to gain access to the vertex of the Vee, and a plate is riveted or brazed to the other side. After fastening and bending to approximate position, this extension is carefully machined so its face is flat, parallel with the bisector but set back from the line of intersection by an amount equal to the thickness of the guide plate. The latter is a triangular piece of flat stock which is fastened through a slot in the extension with a thumb screw, allowing it to line up with any taper and slip down into contact with its surface.

By providing a stop on one end of the rule and leaving the guide plate fixed, identical layouts can be made on many pieces in a very short time. *W. M. Halliday, Lancashire, England.*

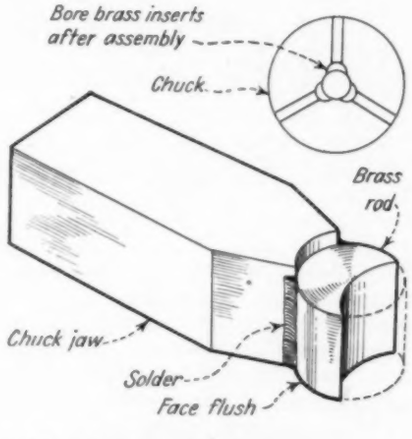


LATHE AND DRILLPRESS COMBINED REDUCES HANDLING—Radial holes had to be drilled around one end of some long, heavy special brass cylinders. After completion of the lathe work, the drillpress, already clamped to the lathe bed, was able to come down directly on the work. An indexing stop was used to space the holes properly and no other locating equipment was necessary. *Burl W. Mansberger, Long Island City, N. Y.*





Broken Center Drills are hard to remove. Work is often irreparably spoiled by the little tip. One good way to get them out is to grind away the remaining stub of the drill into a boring tool which will cut around the lead, causing it to fall out. A new hole can then be started with only a short loss of stock. *D. J. Pilarczyk, Dayton, Ohio.*

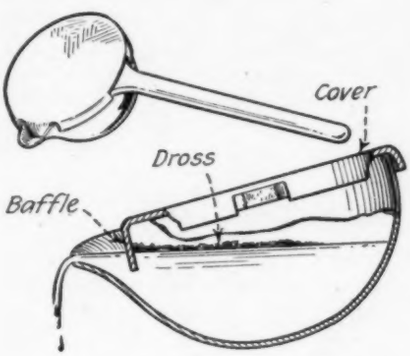


Soldered-Brass Chuck Jaws Protect Finished Pieces

Some chrome-plated parts had to have ¼-in. shanks turned on one end. Ordinarily they would be collet-chucked, but in this case the size varied a little too much, and an ordinary chuck couldn't be used be-

cause it would damage the finish.

Pieces of brass rod were soldered to the chuck jaws which were then uniformly faced. After insertion in the chuck, the jaws are bored to the desired diameter. Concentricity is assured despite small variations in size, and the finish is not damaged in any way. *Allan B. Nixon, Springfield, Mass.*



Baffled Ladle Lid Skims Dross and Saves Metal

Learning by doing, and learning by copying others in following accepted practices can sometimes lead to perpetuation of bad habits.

Pouring babbitt bearings makes a good illustration. Back in the hard times of the early nineties, there was a certain small general-purpose machine shop engaged in taking care of farm equipment of all kinds for miles around.

Apprentices, working for about 5 cents an hour, did a lot of the work. One day, as the old man was dashing through the shop, he paused and stared intently at a pile of refuse where a bearing had just been poured. The top layer was dross, and below it was enough good metal to pour another fair-sized bearing, all left to be swept up and thrown on the dump. The mess was the result of standard practice—to get enough scrap babbitt for the job, melt until it would char a dry pine stick, stir with the stick and finally, skim thoroughly, throwing both dross and stick to one side.

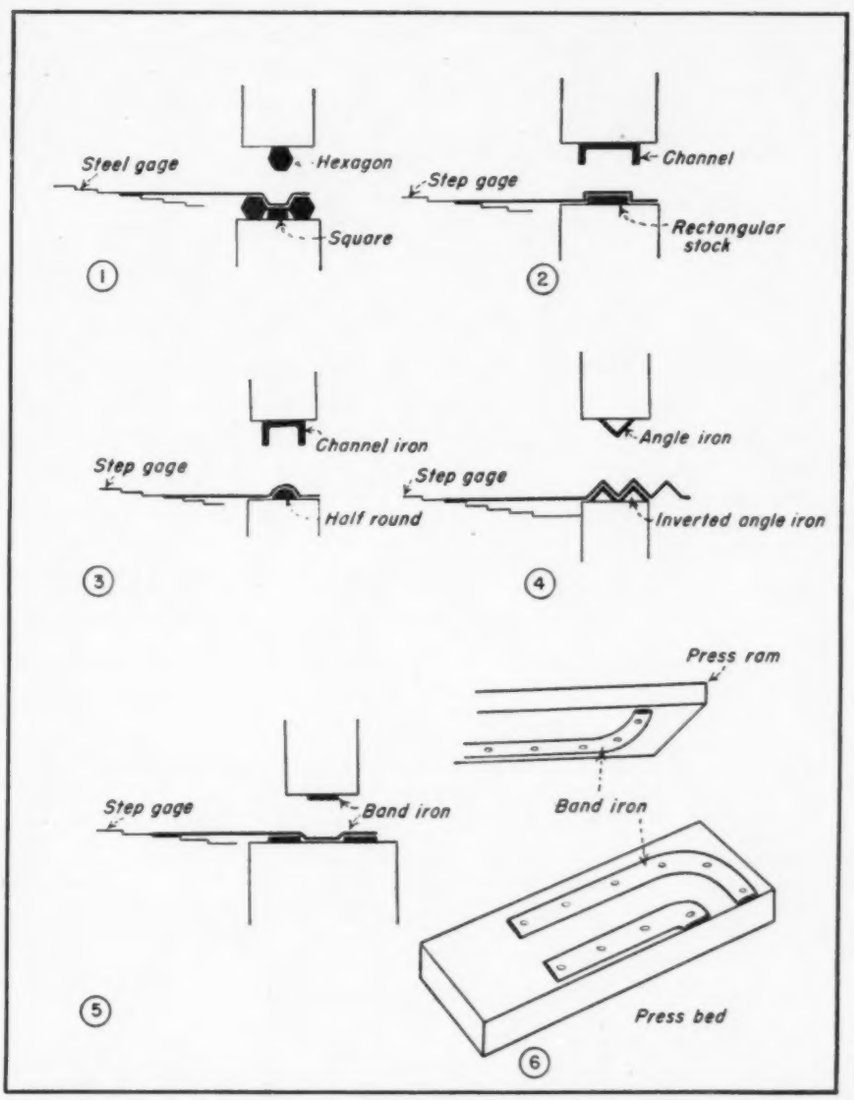
That practice ended then and there. The old man and the straw boss went into consultation and came out with this baffled ladle lid.

The baffle performed several functions. Waste was practically eliminated, because molds were always poured from the bottom of the ladle with the dross remaining on top to conserve heat as well. The pouring opening was only large enough to feed molds properly so pouring speed was limited too. And last but not least, fire hazards and piles of refuse were eliminated, saving the time of the workman assigned to clean up work. *F. M. A'Hearn, Greenville, Pennsylvania.*

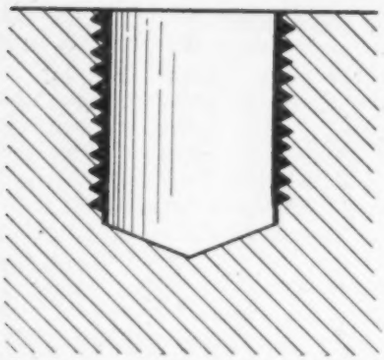
Lathe Cuts Keyways

Keyway cutting in a lathe is easy if you have an adjustable toolpost-screw toolholder. This device consists of a knurled nut which fits over a hollow screw bored to slip on the lathe toolpost. The top of the screw is generously flanged and bored out transversely, and squared to take a ¼-in. toolbit. With the toolbit in place, the screw is keyed against turning because of the toolpost slot, so turning the knurled ring raises or lowers the tool to the spindle centerline.

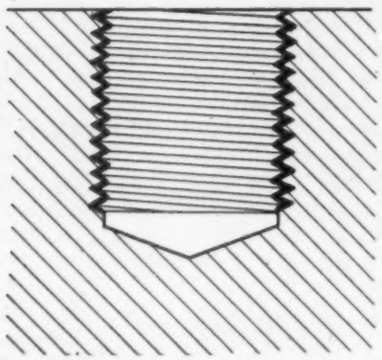
Bits are ground to desired slot width, work mounted on centers and blocked, power feed engaged to cut the Keyway. *C. E. Bliven, Charleston, W. Va.*



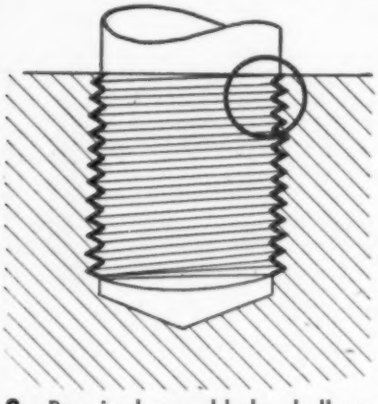
STAMPING DIES—Many sections and shapes can be produced in sheet metal by a small shop without making expensive dies. With a press brake, standard structural shapes can be adapted for a wide variety of parts. The examples above are typical of what can be done. These dies can be quickly and inexpensively assembled. Though less accurate than precision dies, they will give good service for many applications. *Raymond F. Ball, Utica, N. Y.*



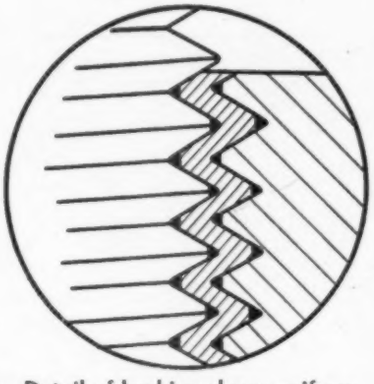
1 Rebore the stripped thread, retap, and install bushing



2 Chase thread to old size, starting at same point



3 Repaired assembly has bellows-shaped opening



4 Detail of bushing shows uniform wall thickness

Stripped Threads can be renewed even when space is at a premium by redrilling, tapping and inserting a threaded bushing. The new thread should have the same pitch as the old and only slightly greater diameter. Now, the bushing is tapped to the same size as the original thread, taking care to start the thread at exactly the right point, producing a bellows-shaped bushing, with approximately the same wall thickness at all points. To assure accurate location, the bushing could be threaded inside and out in the lathe, and assembled over the screw and into the retapped hole in a single operation, eliminating the need for special wrenches or other tools. *Donald Campbell, Cincinnati, Ohio.*

Vibrator Loosens Chips

Tapping cast iron or removing broken studs or bolts has been aided considerably, we have found, by vibrating the machine element while the work is in progress.

In tapping, the vibration tends to loosen chips and prevent them from clogging or jamming, and the tap goes through much faster making a perfect thread. In removing broken or rusted screws, penetrating oil, plus vibration, shakes the part enough to break it free when the proper torque is applied. *Joseph L. Villard, Rochester, N. Y.*

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How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

Forty-third Selection—Raymond F. Ball's Built-up Dies

NEWS OF METALWORKING

Voluntary Allocation Plan, Minus Teeth, Developing Into Junior WPB

WASHINGTON—It's not the way Republican congressmen planned it, but the voluntary allocation system which Congress set up at the special session is starting to be more a junior WPB than a junior NRA.

Secretary of Commerce Harriman is setting up a governmental staff on the war pattern—complete with unsalaried business executives—to do for a few choke points in industry something of the sort of scheduling and material-control job which WPB did for the war industries.

The big—and critical—difference, of course, is that there are no teeth in this very junior WPB. The new organization, still nameless, will draw up its schedules and allocations just as if it had power. But when it comes up with an order which would once have said "you are directed to . . .", it will say now, "you are requested to . . ."

In charge of the new program Secy. Harriman has put H. B. McCoy, rising young (47) career man in the department who is now head of the Office of Domestic Commerce and of the Office of Material Controls.

Staff of 150 Intended

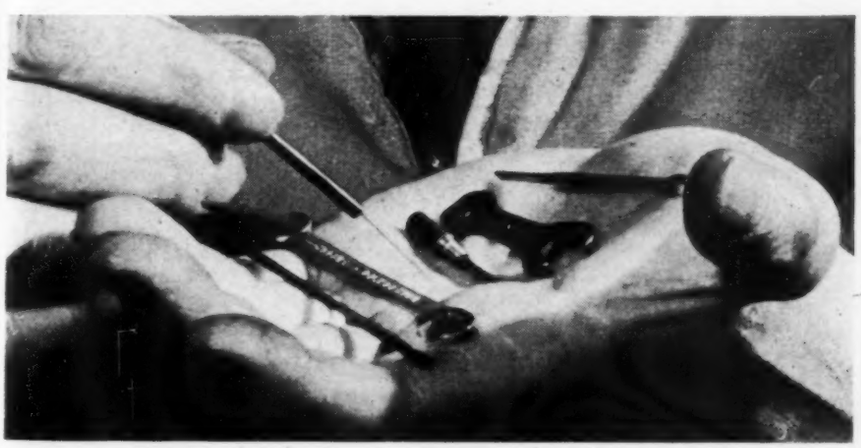
A dozen industry people already have been invited to serve at least part time in getting the outfit going. Eventually, a staff of 150 or so persons is intended, but most outsiders figure that if the program ever gets anywhere at all it will start burgeoning in typical Washington fashion.

Seldom has a major government operation started under more ambiguous auspices or with less conviction on anyone's part that it could work. It is an outgrowth of political maneuvering. As one administration official puts it: "The President threw a curve ball at the Congress. They sent back a floater. Now it's up to us to catch it."

At the beginning of the special session, President Truman submitted a request for allocation powers as part of a catch-all inflation program sent over with little expectation—and on the part of much of the Cabinet, little desire—that it become a law. This put the President on record as being against high prices and put Congress on the spot.

Antitrust Laws Waived

The GOP answer was a system of voluntary industrial self-government on the NRA pattern, backed up by a waiver of the antitrust laws. Secy. Harriman riposted by incorporating in the administration proposals a "voluntary" allocation system, to be worked out in consultation with industry, and to be supported by the threat of imposing mandatory controls. The President, meanwhile, damned the GOP plan as opening the floodgates to monopoly and let veto talk leak from the White House.



Tom Thumb Tools, used in the research laboratories of Cities Service Co., Hillside, N. J., are small enough to be held in the palm of a hand. Work is sometimes so small that the tools must be guided with the aid of a glass

Vice Admiral Hussey

Guides ASA—Vice Admiral George F. Hussey, Jr., has assumed his duties as administrative head of the American Standards Association, succeeding Dr. P. G. Agnew, who has been named consultant

The Republicans thereupon incorporated Secy. Harriman's language into their own measure—without the potential compulsion. If voluntary measures failed. President Truman was to report, in detail, to Congress.

That's the genesis of Mr. McCoy's program. Perhaps his best hope of success is that businessmen who are active in GOP affairs will have a political motive for seeing that it works.

In Secy. Harriman's mimic war agency, voluntary agreement plays the part of priority power, and the role of munitions is taken by five key production programs: Freight car building, manufacture of farm machinery, manufacture of electric utility equipment, production of nitrogen fertilizer. Production of caustic soda may be added to the list later.

For each of these voluntary programs (VP-1, VP-2, etc.), the government staff will establish a production goal, based on essential domestic needs and Marshall Plan requirements. To make up this goal, a production quota will be assigned to each producer in the industry. The quotas can be based on whatever combination of capacity and past ex-

(*Continued on page* 127)

Gaging Business

No Relief in Steel

Steel is as tight as ever, with no signs of immediate relief. One trouble is that much tonnage is being allocated voluntarily for certain vital projects—pipelines, housing, railroad cars. The amount for distribution elsewhere thus is reduced.

▸ Sheet and strip will go through their worst period in the first quarter. Before midyear some mills should have their new facilities in operation, helping to ease the tightness. Meanwhile, many conversion deals have been worked out by big users to tide them over the emergency.

Plates Are Critical

The practice of large users of purchasing non-integrated mills aids a particular company to solve its own sheet and strip problem. But it reduces the overall tonnage of flat-rolled steel available to consumers generally.

▸ Plates are critical in supply. Some of the important users have made up their tonnage deficits by heavy warehouse buying, by conversion arrangements and by securing increased allocations from mills.

Foundry Situation Easier

Despite pig iron shortages, gray iron foundries are in relatively good shape. Some castings users with inadequate foundry facilities of their own are finding it possible to place considerable tonnages outside. But production trouble is looked for by the second quarter if pig iron stays as tight as it is.

▸ Steel casting supply, by contrast, is sufficient to meet all current needs.

Aluminum Is Tight

Sheet aluminum is getting tighter day by day. New orders placed now carry a delivery date of next April or later. Even pig and ingot aluminum are critically short, and allocations may be put into effect.

▸ The situation is so serious that aluminum companies are refusing orders until the first quarter situation clarifies. Not for a number of weeks will enough pig and ingot aluminum be at hand to operate fabricating plants at capacity. A threatened power shortage is a complicating factor.

Copper Demand Heavy

Copper demand is heavy. There is discussion of higher prices, but chances are good that the current level will hold.

▸ Brass mills have had to expand operations to keep up with incoming business, which recently has spurted. Wire products, however, are likely to be under less pressure the next few months because of slackened buying by utility companies.

Tin To Continue Scarce

Tin will continue to be a scarce commodity. Full production in the Far East will not be reached until 1949. Meanwhile Bolivian interests are expected to ask higher prices for concentrates for the Texas smelter.

▸ Lead users who adhered to a short-term inventory policy are in trouble. The lead demand is terrific, the shortage is world-wide, and consumers in general have slim stocks. With Marshall program needs added to present abnormally high requirements, lead is in for a critical period throughout 1948.

▸ Zinc is in little better condition than lead. Users want large quantities and the supply is not ample. Some domestic zinc is being exported at more than the price to U.S. consumers.

Pig Iron Very Short

Pig iron is as bad as steel. Foundries are in for a tough time because steel mills are using more pig in proportion to scrap than they normally do. In addition, producers of soil pipe and allied products are being allocated large quantities of pig iron by the housing authorities, thereby cutting down the tonnage available to commercial foundries.

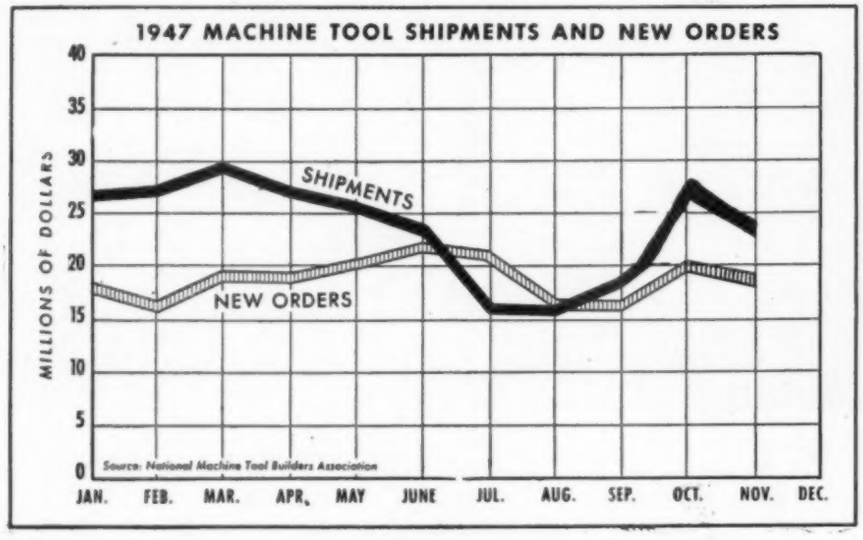
▸ Foreign pig iron shipments to France and Italy, as well as contemplated exports under the Marshall program, will complicate the situation further.

Machine Tool Shipments Up

Machine tool shipments during December are estimated to have taken an upward turn. The month's total was somewhat above the $24.5 million of November, bringing the 1947 dollar volume up slightly over the $300-million mark.

▸ New orders are reported to have dipped from the $21-million level in November. There is no significance in this drop, however, as it inevitably occurs in the final month of the year.

▸ Machine tool builders have lost none of their optimism about 1948. They are concerned over the possibility that voluntary allocations requested by Washington might cut down their supply of castings. They also feel that the planners of the Marshall program should revise their fund allocations to include machine tools.



1947 Machine Tool Production
(Thousands of Dollars)

Month	Shipments	New Orders	Unfilled Orders
Nov; 1946	$26,176	$19,120	$170,127
1947			
Jan.	26,542	18,991	154,760
Feb.	26,765	16,780	146,145
Mar.	29,012	19,509	137,175
Apr.	26,857	18,220	128,830
May	25,791	20,018	121,155
June	24,383	23,810	120,268
July	18,924	22,227	124,155
Aug.	18,520	16,037	122,854
Sept.	22,285	16,294	116,109
Oct.	27,845	20,917	113,674
Nov.	24,503p	19,446p	110,122p
Total (11 mos.)	$271,127	$212,251	

p-preliminary
Note: Foreign portion of unfilled orders is 25% of total.
Source: National Machine Tool Builders Association.

perience looks most effective and most likely to meet industry approval.

For example, each car builder will be asked to signify his voluntary acceptance of program—VP-1—in consideration of government help in getting materials to meet his production quota. If some firms are not satisfied with the quotas assigned them, the whole industry will be asked to sit down together and divvy up the production goal among themselves in a mutually satisfactory way. Perhaps they will be able to. If they are not the whole deal falls on its face right there.

Similar To CMP

Assuming VP-1, in this example, is accepted by the industry and cleared by the Justice Department antitrust lawyers, it will be up to the car builders to submit detailed bills of material to the government—much as was done under the wartime CMP.

From these, the government staff can tell what materials and components—steelplate, motors, etc.—will be needed to meet the production goal.

Then comes the critical step. Voluntary agreement must be obtained from the material and component suppliers to give preference to the needs of VP programs. This will be tougher, because the government has no compensating benefits to offer—except such indirect ones as telling steel producers, for instance, that more cars would mean better coke supply to the steelmills. The one sanction available is the threat of a report to the Joint Economic Committee of Congress saying that such and such firms in such and such industry were not playing ball.

If agreement can be obtained from the suppliers, it is thought that no detailed scheduling of order boards or elaborate priority apparatus will be needed. Tentative plans run something like this:—suppose it is found that the freight-car program—VP-1—in the second quarter of 1948 will absorb 13% of the total production of a particular gage of steel plate. Then all steelplate producers would be asked to allot 13% of their output to the car program.

A car builder would place orders for plate with his regular supplier, certifying: this material is needed to meet my quota under VP-1. Then he would get preferential delivery.

Must Obtain Supplier

If the producer was already booked up to 13% with VP-1 orders, he would refuse the order. Then the car builder would try to find another supplier who had a spot for a VP-1 order. If the calculations have been correct, he will always be able to find a hole. If he can't, he will phone Washington.

This sounds simple enough, but the difficulties are obvious. What happens, for instance, if a plate roller complies technically but shifts production to another gage of plate? Then it would be necessary to ask him to voluntarily keep his production in a certain pattern. Sooner or later, as the requests spread, someone will balk.

The way the new voluntary allocation system is laid out, it is clear that the steel industry is crucial. For one thing, the key shortage that runs through all five programs is steel. For another, if steel cooperates voluntarily with the government, it acts as policeman for everyone else.

It is equally obvious that the steel industry bears the brunt of the plan. If the VP idea gets more steel for the preferred program, that means less for other customers. And that makes life hard for steel sales managers. If the industry asks government to get it off the hook, all Mr. McCoy can do is ask the big steel users, autos for instance, to agree voluntarily to order less steel. And that would be a job calling for eloquence.

Thus far the plan is fairly clear—if tentatively—laid out. Hazier in the distance are several other moves, of which the most significant is production rationalization. Here is where industrial self-regulation might get a workout.

For example: electric equipment manufacturers have long been trying to induce electric utilities to order standard designs of generators, transformers and such. But each utility is likely to have its own ideas. Some producers might agree among themselves to accept no nonstandard orders. Normally this would be illegal, but the new antitrust waiver takes care of that.

Seated in Deep-Cushioned Comfort, travelers aboard the Burlington's new Vista-Dome Zephyrs enjoy a penthouse view of the surrounding countryside. Each seat has individual foot rests, ash tray, reclining back and adjustable arm rest. The lowered floor provides ample head room

Dr. Jacob B. Den Hartog, (right) professor in the department of mechanical engineering, Massachusetts Institute of Technology, received the Richards Memorial Award from **Eugene W. O'Brien,** Atlanta, Ga., retiring president of the American Society of Mechanical Engineers, at the ASME annual meeting at Atlantic City. Dr. Den Hartog was cited for "outstanding work in applied mechanics"

Power Shortage to Produce Sharp Cut in 1948 Aluminum Production

WASHINGTON — The aluminum supply situation in 1948 is not too encouraging—there is a 20% shortage already foreseen, and it could get worse.

Any increase over present industrial use of the metal, such as an increased requirement by the airframe industry, would add just that much more to the presently predicted 320-million-pound deficit.

Scarcity of electric power is the reason for the shortage. All three of the major producers, Aluminum Co. of America, Reynolds and Kaiser, next year either will be cut off from some of their present power sources or will be unable to regain those dropped last summer when several large plants shut down in the face of an aluminum surplus.

Of the three, Reynolds is in the worst fix. Its Longview, Wash., plant, which closed down last spring and gave up a power contract with Bonneville Power Authority, has not been able to regain this source of current. This means that 60-million pounds of pig aluminum will not be produced.

The company's Lister Hill (Ala.) plant has two of its pot lines down and is unable to obtain power commitments from TVA to put them back into operation. This means another 40 million pounds less aluminum.

Negotiations with War Assets Administration for the lease of two idle pot lines at the Jones Mill (Ark.), where Reynolds already has two lines in operation, have bogged down again because of power. Arkansas Power & Light Co., which supplies the area, has all the customers it can handle. Although the utility recently purchased additional generation facilities, this new source of power will not be "on the line' until early 1949. This will hold back the production of aluminum by another 70 million tons.

The Bonneville power shortage also shows up in the Kaiser Co. Spokane, Wash., plant, where another 36 million pounds of the metal could be produced, but will not.

Because it has three power dams of its own in the TVA chain, Alcoa has sufficient power for its plants in that area. On the West coast, however, the company is in for trouble. One pot line at the Vancouver, Wash., plant is operating on a power contract which extends only up until April. After that time, the company fears, Bonneville will not renew the contract. One of the other aluminum producers in the area might get the power, and again it may not. If the ALCOA line shuts down another 30 million pounds of production capacity will be idle.

One big source of aluminum pig, 150 million pounds, the remelting plants at the huge Western warplane scrapping yards, will dry up in May. Other industrial scrap, which the industry has been using at the rate of 150 million pounds this year, is expected to be harder to find next year.

Aluminum Co. of Canada will be able to fill some of the deficiency this year, but not soon enough to help materially. Although this company has been shipping metal to this country right along, it has been using only about 60% of its plant capacity. Unable to find enough of a market for all of its output, the Canadian firm rented out its idle electric power to other industry. Just how fast it can get its power back to increase production is a major question.

The Canadian producer has everything to gain by increasing production. The new tariff rates on aluminum, reduced one cent a pound at Geneva, became effective Jan. 1. This means a very tidy profit on the low - cost metal which can be shipped to the Detroit-Cleveland area faster than can the American product.

Summed up, the supply situation shows a probable production shortage of 200 million pounds, plus 150 million pounds of remelt warplane pig, and an unknown quantity of scrap—a total of more than 350 million pounds which the American industrial community had better not count on during the better part of 1948.

King Machine Tool Changes Hands

CINCINNATI—The King Machine Tool Co., manufacturer of the King Vertical Boring Mills and Sebastian Lathes, has been purchased by American Steel Foundries.

The business, which will be operated as the King Machine Tool Division, will continue present policies, according to Thomas Drever, president of American Steel Foundries.

R. D. Brizzolara and C. F. Elmes, vice presidents, will operate and manage the business. Charles F. Muller, formerly president of King, has joined the organization's new management staff.

100th Anniversary Marked

DETROIT — Whitman & Barnes, manufacturers of twist drills, reamers, punches and special tools, is observing its 100th anniversary this year.

Detroit

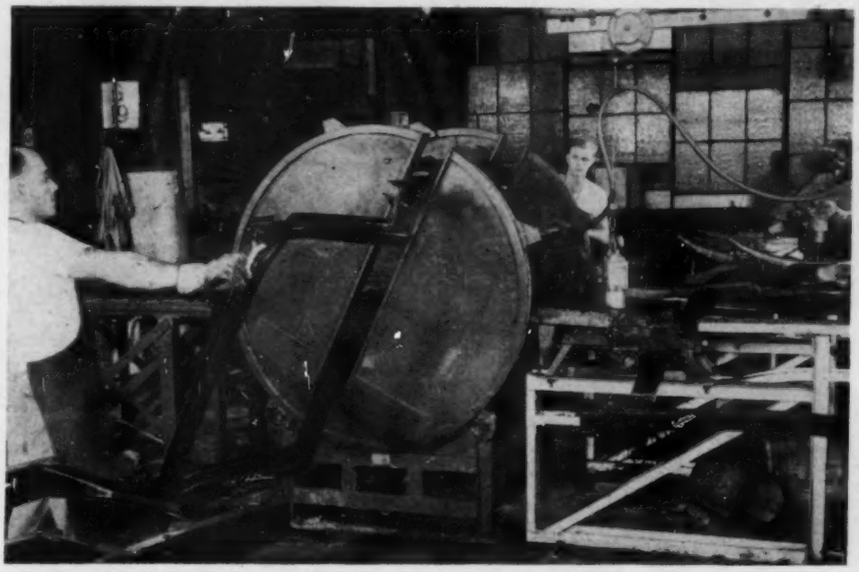
AUTO INDUSTRY TO SEEK ALL-TIME PRODUCTION RECORD... DEMAND FOR NEW CARS SEEN HOLDING... CONCERNS FEAR WAGE INCREASES

Its third best year behind it, the automobile industry heads into 1948 with the aim of setting a new all-time record.

Output during 1947 modestly eclipsed the 5,016,437 of 1937, preliminary figures indicates. This left only 1929 and 1941 ahead of last year. For 1948 the car and truck makers in U.S. and Canadian plants expect to be able to surpass—but not by any consequential margin—the 5,621,045 assemblies of 1929.

To do this, some easing of the steel situation will be necessary. A part of this will come out of expansions at Great Lakes Steel Corp., now being completed. Other flat-rolled facilities are expected later in the year.

Additionally, the auto people feel that scattered other consumer lines will reduce their own hitherto intense demands for sheet during 1948, leaving a small extra margin for cars and trucks. The combination of these factors is expected to result in production of 1,200,000 trucks (about the same as in 1947) and 4½ million passenger cars or more.



Turnover Fixture, developed at Studebaker, eliminates the former hoist-and-sling method of turning an automobile frame. It consists of a slotted drum which turns on four ball bearings, supported on a welded base. Two workmen push the frame into the slots, then spin the drum through 180 degrees. The operation comes between frame boring and the attachment of springs and axles, etc. The frame must be upside down for the last named processes

Demand Still Unflagging

That demand is still unflagging was well indicated late in December in Detroit when the buyer of the third 1948 Hudson to be delivered in the city went at once to a used car lot to resell it. The "used-car" price on this $2600 job promptly was pegged at $3200. This jump, in the face of a general seasonal softening in second-hand car prices, was fairly good evidence that brand-new postwar designs quickly whet motorist appetites. No automobile executive anticipates anything but a continuation of intense demand in 1948. Heavy trucks, however, are now in a more normal market, and medium trucks are approaching it.

Production over the holidays held up better than is usually the case. Chevrolet, Pontiac, and Cadillac divisions of General Motors worked, as did all the Chrysler divisions. Hudson and Willys, among the independents, also operated.

Plants Reopen Rapidly

Plants closed down over the year-end reopened rapidly. Ford divisions moved back into stride which will be maintained until new-model shutdowns during the spring. Buick also got back into quick operations after revamping plant equipment to produce its new torque converter-type transmission. Olds, too, resumed in short order early in January, adding one new model, the "Futuramic."

Worries over pricing are again besetting the purchasing departments. The indication is fairly definite that 1948 will see automotive quotations advancing again. Here and there are authentic reports of buying well beyond normal purchase order lengths to assure deliveries at current prices.

There will be no question of advancing prices if labor's demands are translated into wage increases. United Auto Worker locals in General Motors, Ford, and supplier plants have piled onto a grass-root bandwagon for a 25-cent boost when negotiations begin in the spring.

Slight Advance Not Bothersome

Any raising of the automotive wage average from $1.47 to $1.72, as demanded by the Auto Workers, would be a body blow at price stability. Detroit feeling is that modest advance—say five cents an hour or so—could readily be absorbed in steel, and all along the line through autos. Anything larger, however, would automatically enlarge quotations on delivered goods.

Kaiser-Frazer Corp. celebrated the end of the year in a variety of ways. Most important was the cleaning up of a $12 million indebtedness to the Bank of America. Remaining balances of $10 million, 920 thousand were paid out, enabling the concern to complete a really fabulous year of growth with a cash balance of about $18 million and all trade accounts on a current basis. That is a far cry from nine months ago, when some suppliers were understood to be delivering on practically C.O.D. basis.

K-F production, now above 1000 units a day, is being aimed at 1500 by next summer, with 300,000 autos scheduled for completion in 1948. That volume would put the combined K-F output behind only Chevrolet, Ford, Plymouth and Buick. Splitting of the production between the two nameplates, however, would probably drop either type out of fifth position.

Ford announced that it has spent more than $80 million for retooling its lines. New Ford trucks are scheduled for mid-January introduction, with new Lincoln and Mercury showings in March, then Fords in May or later.

Record Expenditure

That $80-million figure is undoubtedly a record expenditure for any single manufacturer at one time. Before the war manufacturers talked of $50-million tooling programs with hushed voices. Naturally, today's $80-million certainly buys no more than those smaller—and possibly somewhat exaggerated—prewar tallies. On the score of work being done, the Ford expenditures have been coming out gradually, instead of all at once, and the result is that the tooling-shop backlog has been steadier than usual.

Highest Civilian Medal Awarded To Mason Britton

WASHINGTON — Mason Britton, president of the Metal Cutting Tool Institute, New York City, was presented the Medal for Merit Dec. 23, awarded by the President, for his outstanding wartime service in directing the increased production and distribution of machine tools.

The Medal for Merit stems from the Badge for Military Merit, America's oldest decoration, established by George Washington in 1782. The Medal for Merit is the highest civilian award which the government can bestow.

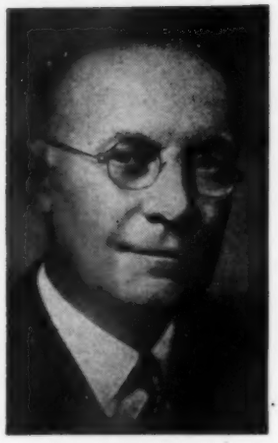
Mr. Britton, who was connected with the AMERICAN MACHINIST and McGraw-Hill Publishing Co. for more than 40 years, retired from the company in 1944.

Navy Dept. Ceremony

Under Secretary of the Navy W. John Kennedy made the presentation at a ceremony in the Navy Department.

The text of the President's citation:

Mason Britton, for exceptionally meritorious conduct in the performance of outstanding services to the United States during the period of the recent war. Mr. Britton, while serving on the National Defense Advisory Commission and in the Office of Production Management, later the War Production Board, in charge of the production and distribution of tools, by his unstinting effort, high degree of intelligence, and ability to obtain cooperation, succeeded in increasing the production of machine tools, cutting tools, and gages to meet the vital need of industry and the Armed Services for the war effort. He organized his staff in a most thorough and capable manner, gather the most efficient tool engineers in the country to assist in the production programs, which could not be undertaken until such time as machine tools were available in balanced quantities. Through his personal efforts, the flow of machine tools to industry commenced at an early date and continued at a pace which permitted plants to be tooled up in time for the major war production program. With the utmost patience, tact, and discernment, his major efforts were directed to the fair and equitable distribution of tools to meet urgent demands. Mr. Britton's contributions were vital factors in the successful prosecution of the war.



Mason Britton

Record Steel Shipments

SAN FRANCISCO—Shipment by mid-December of 297,758 net tons of finished steel by the Pittsburg plant of Columbia Steel Co. surpassed even the wartime peak year of 1944 when 293,144 net tons were produced.

1947 Expansion At 181 Million In Chicago Area

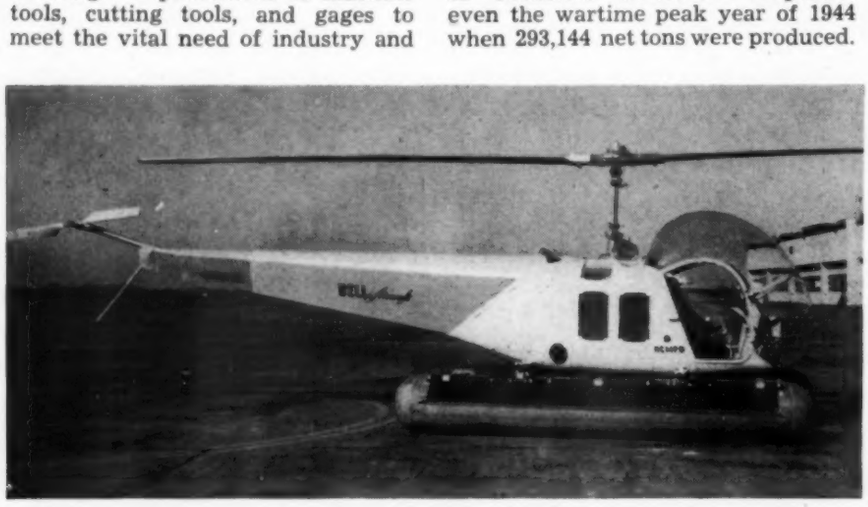
CHICAGO—Expansion of industrial production facilities authorized in metropolitan Chicago area during 1947 totaled about $181,297,000, according to the Chicago Association of Commerce and Industry.

This figure almost equals the 1946 total of $184,488,000. At least $110 million of last year's total was for construction of new facilities, as well as expansion of existing plants in the metals producing and metalworking fields.

The projects authorized during 1946 and 1947 brings the 7½-year total for industrial expansion in the metropolitan area to a record value of $1,688,455,000. Of this sum $1,166,970,000 was for war production facilities. Starting in mid-1940, when expansion of facilities for war production first got under way, this area saw greater expansion than any other similar area in the United States.

And on plants constructed during that time for making war goods, only four to date have not been converted to making peacetime products.

Top industrial names are included among those now expanding in the metropolitan area. U. S. Steel has authorized expenditure of $300 million, during the years 1941 through 1947. Republic Steel, Youngstown Sheet & Tube, and others also have large expansion projects under way in the metal-producing field. International Harvester, Westinghouse, Hotpoint, Borg-Warner, Clearing Machine, Illinois Tool Works, Federal Tool, Sterling Tool Products, Poray, and many others in the metalworking field have important expansion programs underway.



Amphibious Operations are possible with the new Bell Aircraft Corp. helicopter 47 D by the attachment of simple flotation gear. The craft can be operated with a completely enclosed cockpit as shown, or with the upper part of the glass canopy and the doors removed

ASTE Sixth Convention In Cleveland March 15

DETROIT—Exhibit space sold for the sixth annual Industrial Exposition in Cleveland of the American Society of Tool Engineers March 15-19 indicates that the show will be the largest in the history of the society. At the last exposition, held in Cleveland from April 8-12, 1946, more than 340 exhibitors displayed new products to 50,000 visitors.

Tentative program for the Exposition in the Public Auditorium includes plant tours in the Cleveland area and discussions by speakers on many aspects of mass production. There will also be open debate sessions on papers presented.

NLRB Struggling To Settle Flood of Labor Actions

WASHINGTON—Employers, unions and individual workers are giving the Taft-Hartley Law the business. Although there are some holdout unions, there is no general boycott of the National Labor Relations Board. It is swamped with work.

Up to Nov. 30, NLRB had received 3,000 new cases under the Taft-Hartley Law. There were 5200 old and new cases awaiting decision. More than 20,000 union officials have filed non-communist affidavits. Almost 10,000 national and local unions have registered financial and organizational data with the Labor Dept.

The Joint Congressional Committee on Labor-Management Relations finds that the law is working and contemplates no changes for the time being. It is soliciting evidence of "specific inequities" resulting from the law, having found none itself.

Labor's "New Look"

A clearer concept of Labor-Management Relation's "new look" comes through the working of the Taft-Hartley Law. Here are some significant developments:

In 1943 union shop authorization polls conducted before Dec. 1, all favored the union shop. First defeat occurred Dec. 5 at Cornell-Dubilier Electrical Corp.'s main plant in Providence where the AFL International Brotherhood of Electrical Workers failed to get approval because of opposition from a CIO minority in the plant.

In 11 decertification elections, the union retained its bargaining status in only three instances.

Individual workers are making most use of the law. Up to Dec. 1, they brought 712 charges against employers and 83 against unions. Unions filed 172 charges against employers and six against other unions. By contrast, employers brought only 132 accusations against unions.

Unqualified unions are denied participation in an election even if it is requested by the employer. This was enunciated in an NLRB decision involving Herman Loewenstein, Inc., Gloversville, N. Y., and was implemented in denying an election requested by Remington Rand, Inc., to determine whether the CIO Electrical Workers still represented a majority of the employees.

Under the Remington Rand decision the company is still free to bargain with the union if it wishes, but cannot be compelled to do so because the union is not in a position to bring charges before the NLRB.

Names in the News

Robert E. Busey

Robert E. Busey has been appointed assistant chief engineer of Willys-Overland Motors, Toledo, Ohio. Mr. Busey, formerly executive engineer for the White Motor Co., succeeds **Walter Benning,** who has been named a special assistant to **Delmar G. Roos,** vice president in charge of engineering.

Henry V. Erben has been elected a vice president of the General Electric Co. and appointed general manager of the apparatus department, succeeding **Roy C. Muir,** who retired Jan. 1. Also, **Joseph F. Eckel** has been named manager of the company's Lynn River Works, succeeding **George M. Stevens,** who retired at the end of the year after 46 years of service.

R. Conrad Cooper has been named vice president in charge of industrial engineering of the United States Steel Corp. of Delaware, while **M. W. Reed** has been appointed chief engineer.

Edwin L. Hobson has been appointed sales manager of thermoplastic molding materials of Monsanto Chemical Company's Plastics Division.

A. B. Muskett, who was formerly associated with Ford Motor Co. and General Motors Corp., has been appointed manager of manufacturing of the General Electric X-Ray Corp., Milwaukee, Wis.

Dr. W. E. Wilson has been appointed director of research of the Hydraulic Division of Sundstrand Machine Tool Co., Rockford, Ill.

James E. Goodman has been named general manager of the Buick-Oldsmobile-Pontiac Assembly Division of General Motors Corp. He succeeds **W. S. Roberts,** who has been granted a disability leave of absence.

Helge G. Hoglund has joined Heald Machine Co., Worcester, Mass. as general sales manager. He has taken over the duties of **Silas T. Massey,** who retired as vice president and general sales manager at the end of the year after 35 years with the firm.

R. B. Gerhardt, chief engineer of construction of the Bethlehem Steel Co., retired Jan. 1. He has been succeeded by **L. J. Gould,** his assistant since 1939.

W. H. Scherer

W. H. Scherer, formerly assistant to the vice president in charge of manufacturing of the Worthington Pump & Machinery Corp., Harrison, N. J., has been appointed general manager and director of the Ransome Machinery Co., Dunellen, N. J.

Walter C. Kerrigan, James F. McNamara and **T. H. Wickenden** have been elected vice presidents of The International Nickel Co., Inc.

Samuel H. Collom, Jr., has been elected executive vice president in charge of production of the Pennsylvania Flexible Metallic Tubing Co., Philadelphia.

Lewis Hamlin has been named executive vice president of Redmond Co., Inc., Owosso, Mich.

Charles W. Myers has been named director of spring sales, manufacturers products sales division, American Steel & Wire Co., Cleveland.

Albert R. Hutchings

Albert R. Hutchings has been appointed executive engineer in charge of engineering and manufacturing for The Carlyle Johnson Machine Co., Manchester, Conn., succeeding **A. R. Coe,** vice president, who has retired.

Thomas C. Bradford, who has been associated with the industrial oil and tool industry for 20 years, has been appointed field technical engineer for the Anderson Oil Co., Portland, Conn.

William C. Madsen has been named branch manager of the Gary, Ind. office of The Reliance Electric & Engineering Co.

J. G. Green has been appointed midwestern representative for the Reading Chain & Block Corp., Reading, Pa. He has established his office at 407 S. Dearborn St., Chicago.

E. T. Cuddeback, sales representative in the Allis-Chalmers Atlantic district office for the past year, has been named manager of the company's Tampa district office.

George G. Raymond, Jr., has been named sales manager of the Lyon-Raymond Corp., Greene, N. Y., while **Frank Forsberg** has become factory manager.

BUSINESS ITEMS

Boice-Crane Co., Toledo, Ohio, formerly a partnership, has been incorporated.

Eastern Carbide Corp., New Rochelle, N. Y., has been established to enable manufacturers to obtain all their carbide needs from one source. Officers of the firm, which is located at 909 Main St., include **Anthony J. Allen,** president and **Walter A. Ruppel,** secretary-treasurer.

Westinghouse Electric Corp. will transfer the small motor manufacturing operations at Fairmont, W. Va. to Bellefontaine, Ohio shortly to permit expansion of fluorescent lamp manufacturing facilities at Fairmont.

Kennametal, Inc., Latrobe, Pa., has established an eastern district office at 6 West Broadway, New York City.

Robertshaw Thermostat Co., Youngwood, Pa., **The Fulton Sylphon Co.,** Knoxville, Tenn., and the **Bridgeport Thermostat Co., Inc.,** Bridgeport, Conn., have merged under the name of **Robertshaw-Fulton Controls Co. John A. Robertshaw** is president of the new organization, while **J. V. Giesler,** former president of Fulton and Bridgeport, has been elected executive vice president in charge of those divisions, and **T. T. Arden** has been elected executive vice president in charge of the Grayson Controls division, Lynwood, Calif.

National Screw & Manufacturing Co., Cleveland, has purchased the **Chester Manufacturing Co.,** Lisbon, Ohio, manufacturers of chain hoists.

The Minster Machine Co., Minster, Ohio, has appointed **Luther and Pedersen, Inc.,** 465 W. Washington Blvd., Chicago, as its exclusive representatives in the Chicago and Milwaukee for its mechanical power presses.

Borg-Warner Corp. has formed a new division to expedite the manufacture and sale of the company's Ingersoll utility unit. The new division, activated Jan. 5, is headed by **Roy C. Ingersoll.**

Syncro Machine Co., Perth Amboy, N. J. and Winget-Syncro of Rochester, Kent, England have become affiliated. Syncro's products will be available to the overseas trade through Winget-Syncro's branch offices in Europe, Asia, Africa, Australia and New Zealand.

OBITUARIES

Henry J. Hinde, 84, former president of the Toledo Machine and Tool Co., Toledo, Ohio, died Dec. 12. Mr. Hinde joined Toledo in 1890 and seven years later he and his brother purchased the firm which he headed until 1932.

Hans B. Kraut, 66, chairman of the board of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., died Dec. 26. He joined Giddings & Lewis in 1924 as vice president, general manager and member of the board. Five years later he became president, retaining his position as general manager. Mr. Kraut relinquished these duties in 1945 when his health required his resignation. He was then named chairman of the board. In his 24 years with Giddings & Lewis he built the firm from a small shop to its present eminent position in the industry.

Hans B. Kraut

Arthur Walsh, 51, executive vice president of Thomas A. Edison, Inc., West Orange, N. J., died Dec. 13. A former U. S. Senator, Mr. Walsh also served three terms as vice president of the National Association of Manufacturers.

Herman W. Zimmerman, 52, president of the Zimmerman Engineering Products Co., died Dec. 17.

Everett N. Gold, 71, who operated the Cast Iron Welding Co., Jamestown, N. Y., until 1945, died recently.

John M. Felt, 75, former assistant superintendent of the New York Air Brake Co. plant in Watertown, N.Y., died recently. He also at one time was general manager of the Ingersoll-Rand plant at Athens, Pa.

MEETINGS

American Society of Tool Engineers. Sixth annual industrial exposition. Public Auditorium, Cleveland. March 15-19. J. M. Cannon, director of public relations, 1666 Penobscot Bldg., Detroit 26.

Materials Handling Exposition. Public Auditorium, Cleveland, Jan. 12-16. Clapp & Poliak, 350 Fifth Ave., New York.

Pressed Metal Institute. Annual meeting. Hotel Statler, Buffalo. Feb. 10-11. Sam Morrison, vice president, Morrison Steel Products, Inc., Buffalo, chairman.

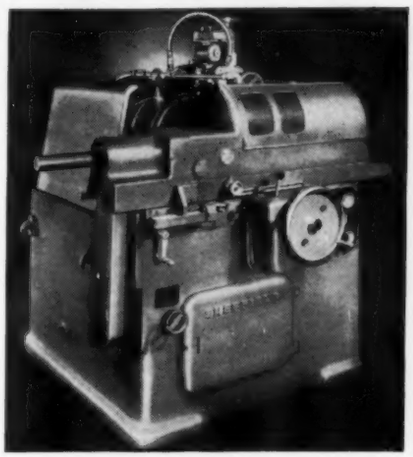
Society of Automotive Engineers. Annual meeting. Book-Cadillac Hotel, Detroit. Jan. 12-16. John A. C. Warner, secretary and general manager, 29 West 39 St., New York.

SHEFFIELD MACHINE TOOL DATA

TFG - #123-4

NEW PRECISION ANNULAR FORM GRINDER FOR CRUSHTRUE GRINDING

Sheffield announces a Precision Annular Form Grinder as an addition to its line of precision grinders. This new machine utilizes the Crushtrue principle of wheel dressing for the rapid production of cylindrical forms such as circular form tools, crusher rolls, ball bearing races and seals, shift grooves in automotive and farm implement transmission gears, and other annular forms of intricate and precise profile.



MACHINE FEATURES:

Live or Dead Center Workhead
Infinitely variable work speeds
Semi-Automatic Power Crushing
Wheels form dressed up to 2" face
Swings 7" work 12" between centers
Precision work spacing device

Write for Engineering Data TFG 123 and 124

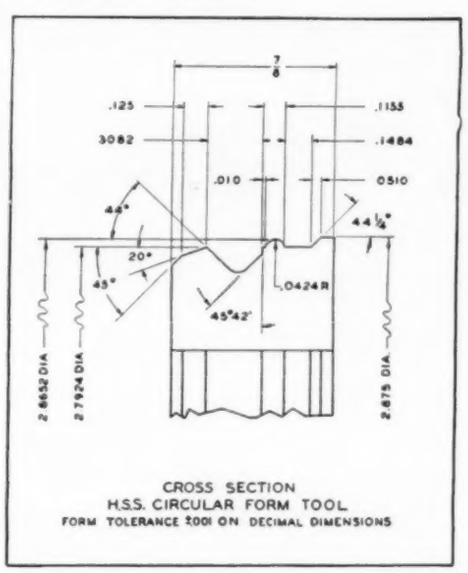
GRINDING TIME CUT FROM 4½ HOURS TO 4 MINUTES

This circular tool has a contour involving a blend of radii, straight sides, angles and flats. Prior to using the Crushtrued full form wheel, the work had been made on universal cylindrical grinders by toolroom procedure in lots of 15 to 30, and the grinding time of 4½ to 5 hours per tool was considered top performance.

A master Crushtrue Roll, made on the Micro-Form Grinder, was used to true the wheel on the Precision Annular Form Grinder shown above.

Grinding from the solid required 13 minutes. Grinding on preformed stock having approximately .020" on a side required less than four minutes.

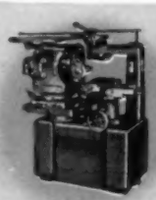
The time required to make the Crushtrue roll compares with that of making the circular tool by conventional means. Therefore, the crush grinding process would show savings that become phenomenal as the quantities increase.



CROSS SECTION
H.S.S. CIRCULAR FORM TOOL
FORM TOLERANCE .001 ON DECIMAL DIMENSIONS

Previous grinding time	270 minutes
Crushtrue grinding time	4 minutes
Time saving	266 minutes
Percent Time Saved	98.5%

Thousands of other production cost problems can be answered satisfactorily by crush grinding with Sheffield equipment. Write for Bulletins M-100-145 and M-120-146.



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Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

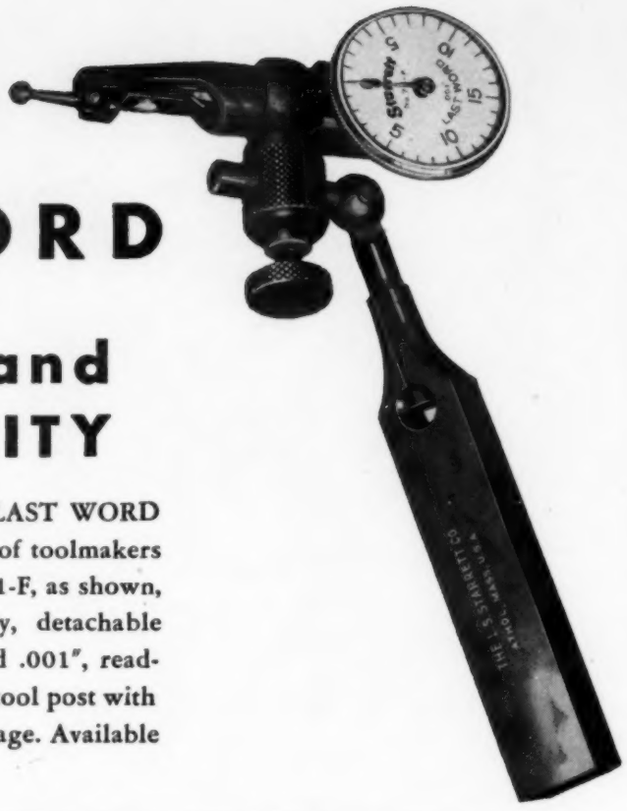
STARRETT DIAL INDICATORS

IT'S THE LAST WORD

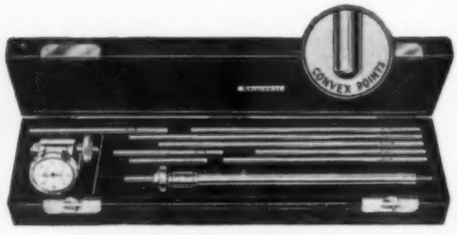
Trade Mark

Reg. U.S. Pat. Off.

in UTILITY and ADAPTABILITY



The universal adaptability of Starrett LAST WORD Indicators has made them the favorite of toolmakers and mechanics the world over. No. 711-F, as shown, has reversible action, swiveling body, detachable ratchet joint contact point — graduated .001", reading 0-15-0. range .030". Can be used in tool post with universal shank or clamped to height gage. Available in other models and calibrations.



INSIDE DIAL GAGE NO. 697

An excellent gage for checking parallelism or comparing internal diameters. Zero-setting dial graduated with wide divisions by thousandths, reads 0-.020-0. Ten interchangeable rods and one 8" extension provide a range from 2¼ to 18 inches.

DIAL DEPTH GAGE NO. 640

Press the spindle button and this gage registers the depth of holes, slots, recesses, etc., by half-thousandths. A tell-tale hand and double dial count revolutions of the large hand. Normally furnished with ½" range, dial reading 0-50. Also available as direct reading, reverse movement gage with spindle normally extended (No. 640-R).

For complete information, write for new Starrett Dial Indicator Catalog "C"

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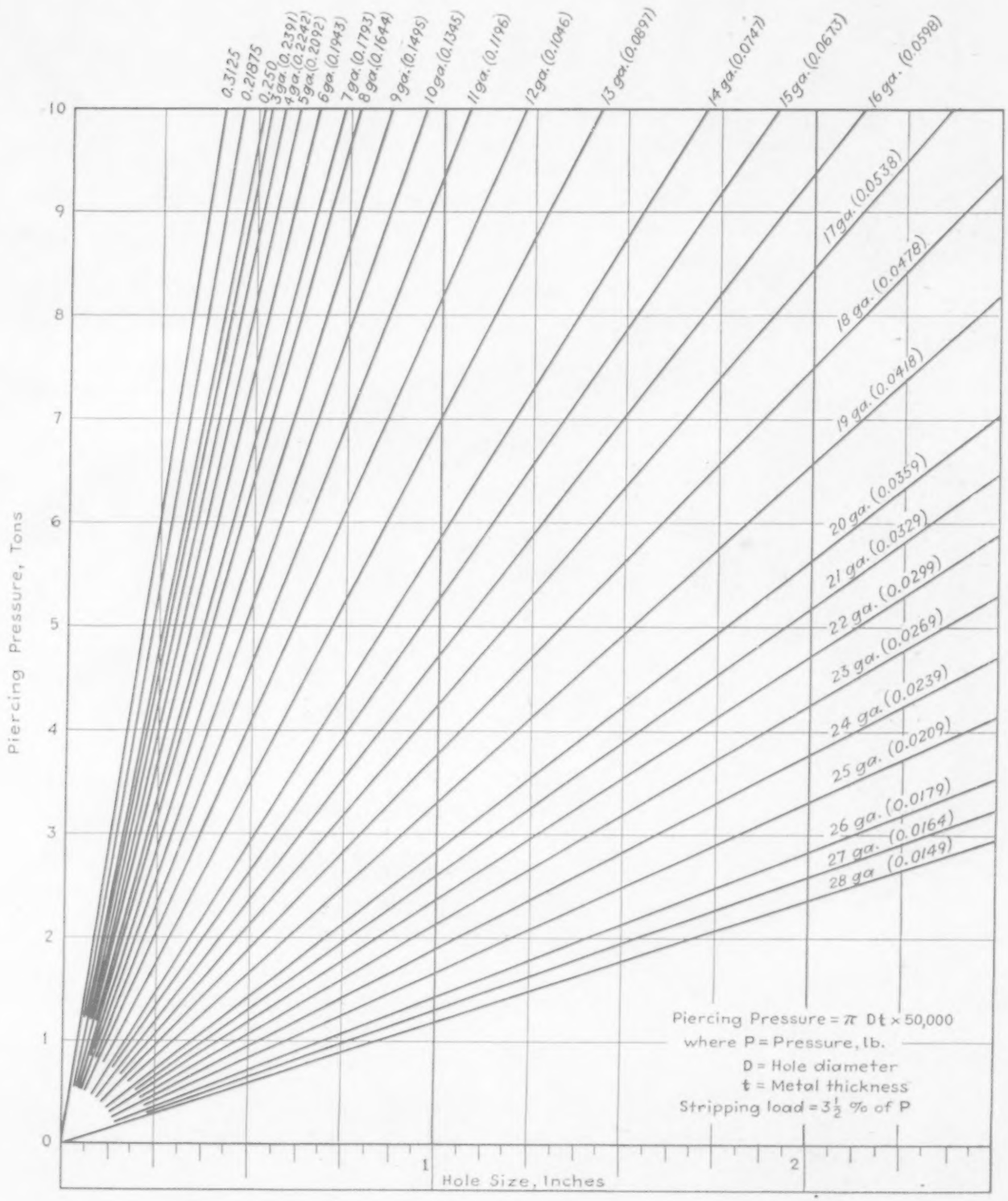
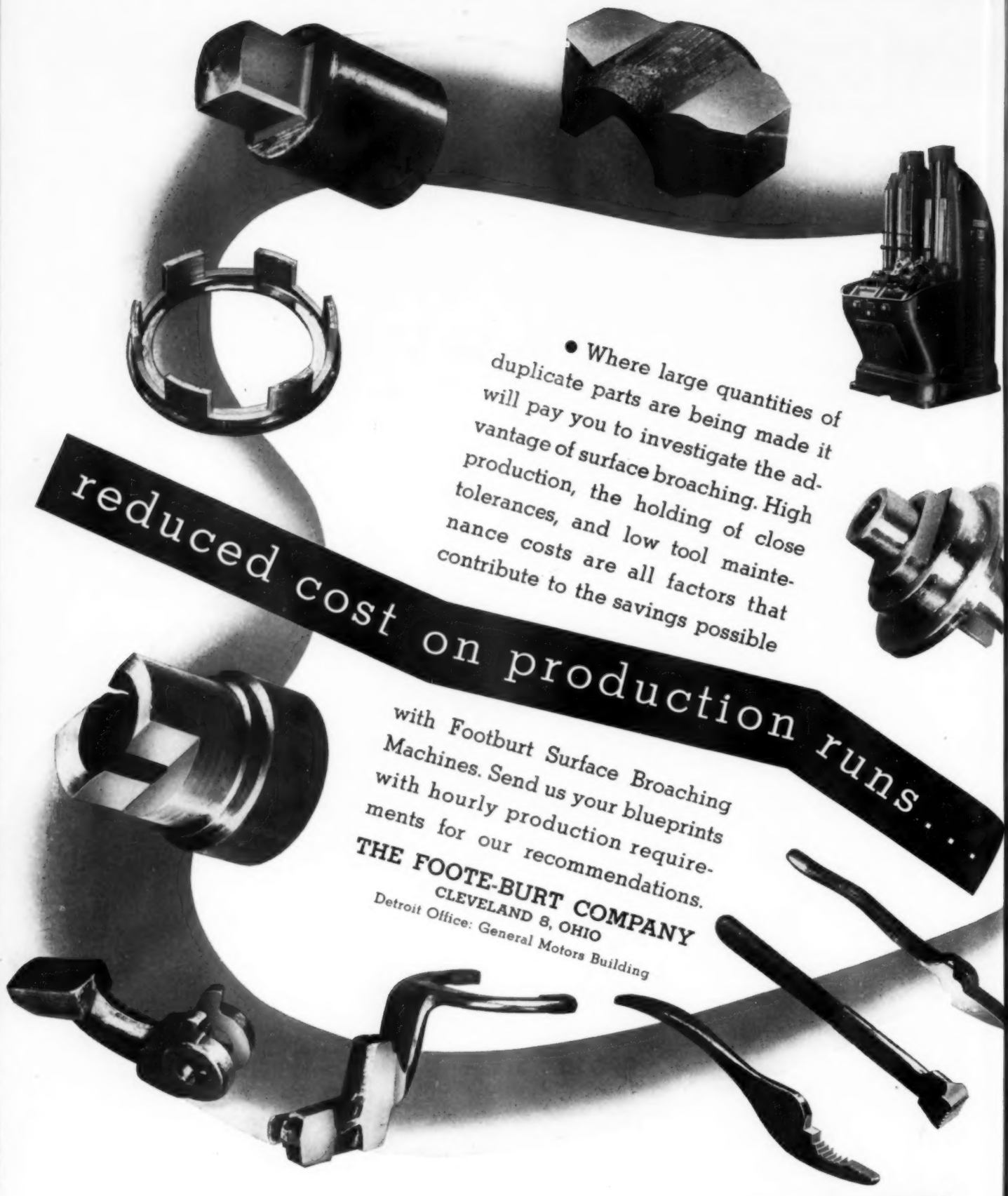
HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

Pressures to Pierce Sheet Steel...I

BY E. V. SARGEANT, ASST. CHIEF TOOL DESIGNER, GENERAL MOTORS OF CANADA, LTD., OSHAWA





reduced cost on production runs . . .

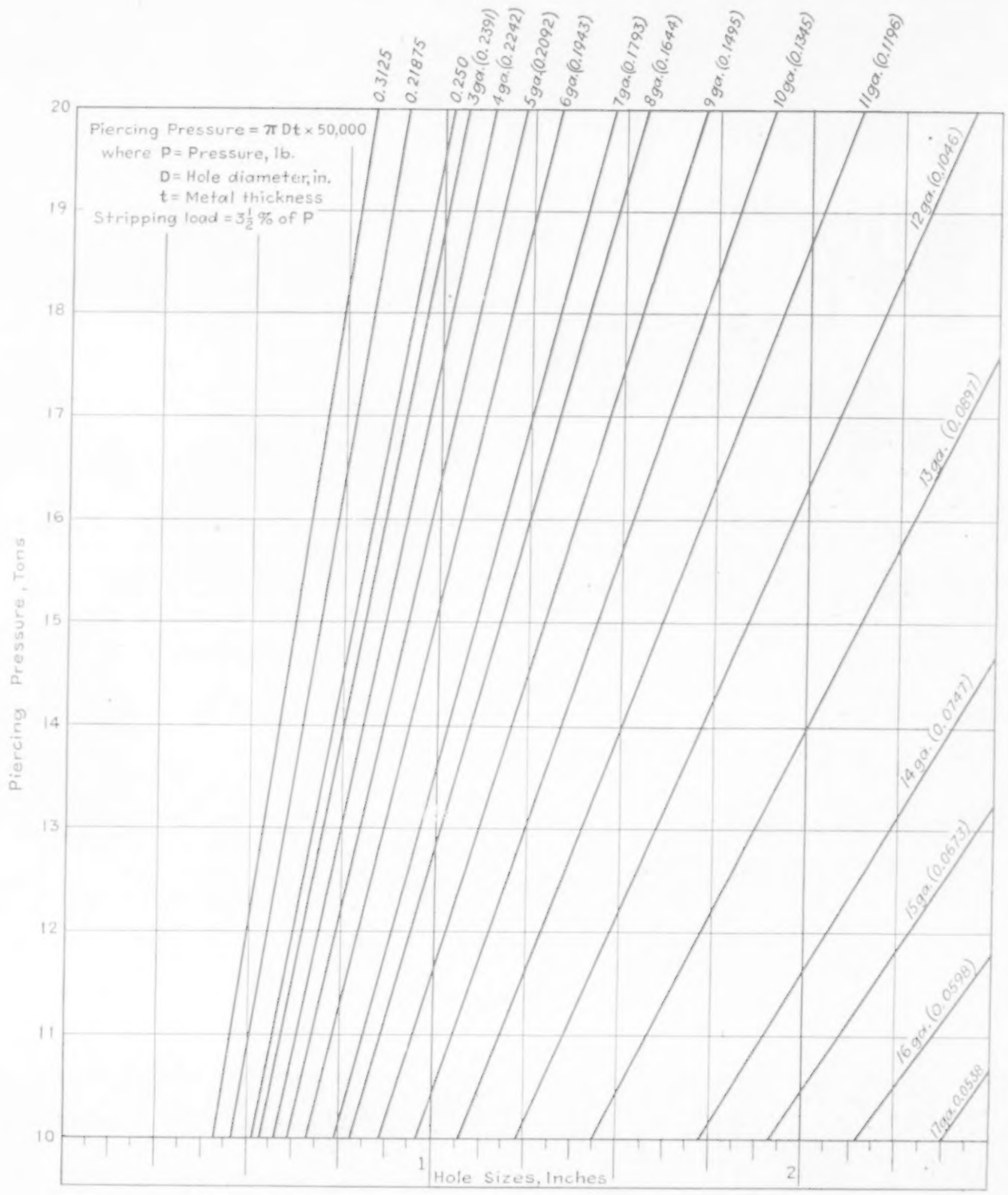
• Where large quantities of duplicate parts are being made it will pay you to investigate the advantage of surface broaching. High production, the holding of close tolerances, and low tool maintenance costs are all factors that contribute to the savings possible with Footburt Surface Broaching Machines. Send us your blueprints with hourly production requirements for our recommendations.

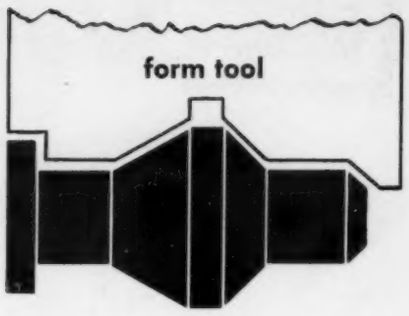
THE FOOTE-BURT COMPANY
CLEVELAND 8, OHIO
Detroit Office: General Motors Building

FOOTBURT *Surface Broaching*

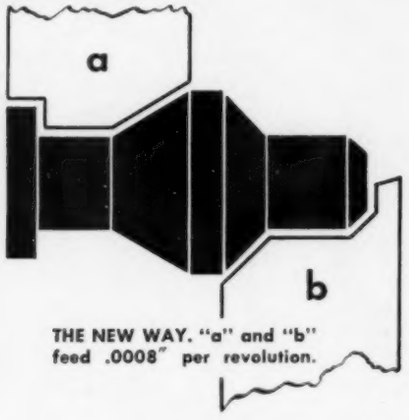
Pressures to Pierce Sheet Steel...II

BY E. V. SARGEANT, ASST. CHIEF TOOL DESIGNER, GENERAL MOTORS OF CANADA, LTD., OSHAWA





THE OLD METHOD



THE NEW WAY. "a" and "b" feed .0008" per revolution.

Find the best way to machine this small furnace-control part from high-carbon stainless steel bar stock. The part must be accurate to close tolerances and hold its edges in service. Good corrosion resistance is a "must."

Before the manufacturer and Armco machining specialists put their heads together on this problem, plans had been made to machine the part with one wide form tool.

Then Armco technicians went to work. They found the original method wouldn't do the job on an automatic screw machine. *Two tools* were necessary.

So they designed a new tooling set-up (see sketch). ARMCO Stainless Steel Type 440C 7/16" bars were used. The cutting rate was 60 S.F.M. The two form tools were put into operation at .0008" feed per revolution.

The new set-up "clicked" in the manufacturer's plant and has been rolling steadily since.

If you have a stainless steel machining problem let Armco engineers pool their experience with you. Or if you can improve your products by converting to ARMCO Stainless Steel sheets, strip, bars or wire, let's talk it over. Just write The American Rolling Mill Company, 428 Curtis Street, Middletown, Ohio.

Get your copy of this MACHINING BOOK

Write on your firm letterhead for your free copy of this valuable new book titled "Machining of ARMCO Stainless Steels." It contains data on all the newest and most successful methods of machining these rustless steels. Address The American Rolling Mill Co., 428 Curtis Street, Middletown, Ohio.

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ARMCO STAINLESS STEELS

Help keep steel flowing from the mills by turning in your scrap promptly. The need is critical — the shortage *greater* than during the war.

Alloys for Non-Ferrous Forgings

COURTESY THE BRASS FORGING ASSOCIATION

COPPER BASE ALLOYS

ALLOY	COMPOSITION (COMMERCIAL LIMITS—%)		DENSITY (LB. PER CU. IN.)	ELONGATION IN 2 IN. (PERCENT)	TENSILE STRENGTH LBS. PER SQ. IN.	YIELD STRENGTH (½% EXTENSION UNDER LOAD) LBS. PER SQ. IN.	YIELD STRENGTH (SET = 0.2%) LBS. PER IN. SQ.	HARDNESS ROCKWELL	HARDNESS BRINELL 500 KG LOAD 10 MM BALL	BEST ANNEALING TEMP. °F
FORGING BRASS	Copper Lead Zinc	60. 2. 38.	.305	45	52,000	20,000		F 78		800-1100
NAVAL BRASS	Copper Tin Zinc	60. 0.75 39.25	.304	47	57,000	25,000		B 55		800-1100
LEADED NAVAL BRASS	Copper Lead Tin Zinc	60. 1.75 0.75 37.5	.305	40	57,000	25,000		B 55		800-1100
MANGANESE BRONZE	Copper Iron Tin Zinc Manganese	58.5 1. 1. 39.2 0.3	.302	33	65,000	30,000		B 65		800-1000
MUNTZ METAL	Copper Zinc	60. 40.	.303	50	54,000	21,000		F 80		800-1000
SILICON ALUMINUM BRONZE	Copper Silicon Aluminum	91. 2. 7.	.278	27	90,000	50,000		B 85		
SILICON BRONZE Type A	Copper Silicon	94.8 Min. 3.	.308	60	58,000	22,000		B 60		900-1300
SILICON BRONZE Type B	Copper Silicon	96.0 Min. 1.5	.316	50	40,000	15,000		F 55		900-1250

ALUMINUM ALLOYS *Symbol**

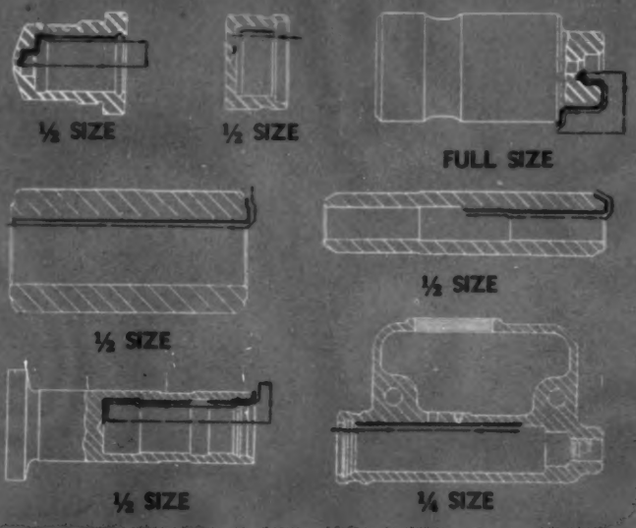
ALLOY	COMPOSITION (COMMERCIAL LIMITS—%)		DENSITY (LB. PER CU. IN.)	ELONGATION IN 2 IN. (PERCENT)	TENSILE STRENGTH LBS. PER SQ. IN.	YIELD STRENGTH (½% EXTENSION UNDER LOAD) LBS. PER SQ. IN.	YIELD STRENGTH (SET = 0.2%) LBS. PER IN. SQ.	HARDNESS ROCKWELL	HARDNESS BRINELL 500 KG LOAD 10 MM BALL	BEST ANNEALING TEMP. °F
2 S-H	Aluminum	100.	.098	15	24,000		21,000		44	
14 S-T	Copper Silicon Manganese Magnesium Aluminum	4.4 0.8 0.8 0.4 93.6	.101	10	65,000		55,000		125	
17 S-T	Copper Manganese Magnesium Aluminum	4. 0.5 0.5 95.	.101	16	55,000		30,000		100	
18 S-T	Copper Magnesium Aluminum	4. 0.5 95.5	.103	10	55,000		40,000		100	
25 S-T	Copper Silicon Manganese Aluminum	4.5 0.8 0.8 93.9	.101	16	55,000		30,000		100	
32 S-T**	Copper Silicon Magnesium Aluminum	0.9 12.5 1. 85.6	.097	5	52,000		40,000		115	
A 51 S-T**	Silicon Magnesium Aluminum	1. 0.6 98.4	.097	12	44,000		34,000		90	
53 S-T**	Silicon Magnesium Aluminum	0.7 1.3 98.	.097	14	36,000		30,000		75	

*S Signifies wrought alloys.
H Signifies completely cold worked.
T Signifies completely heat treated.

**32 S-T contains 0.9 nickel and A 51 S-T and 53 S-T each contain 0.25 chromium.

New boring and turning machines TO BROADEN YOUR PROFIT MARGIN

Model 36



On one of the parts illustrated the bore is limited to a .0005 taper. Many bores have a .001 total limit. On one job the production rate is 1,080 pieces per hour; on another, production was increased from 180 to more than 300. Specifications for the valve stem call for a .0001 limit on size from one end to the other, .0002 for concentricity, and .0006 limit from piece to piece.

Money-saving speed, accuracy and ease of operation make this new line of precision contour turning and boring machines earn their way. Cam and air actuated, the tools positively repeat from piece to piece unaffected by temperature variations.

High production is assured by high spindle speeds and lifetime sealed lubrication of spindle bearings, and by the fact that 2 or more pieces are finished simultaneously with rapid traverse on all idle motions.

An unlimited variety of set-ups can easily be arranged. In addition to straight boring and turning, facing and chamfering, it will accurately follow contours cut on its cams, and will produce lands, recesses, flanges, steps, counterbores, and radii . . . all with a single point tool. Only one dimension cut by this tool requires inspection.

The Machine Tool Show unquestionably demonstrated the enormous new possibilities of automatic machinery. Are you falling behind your competitors by not at least investigating? We will gladly show you how we are changing expensive boring and turning operations into profitable productivity. *Productivity, not price, is the measure of a machine.*

NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE.

THE NEW BRITAIN MACHINE CO.

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

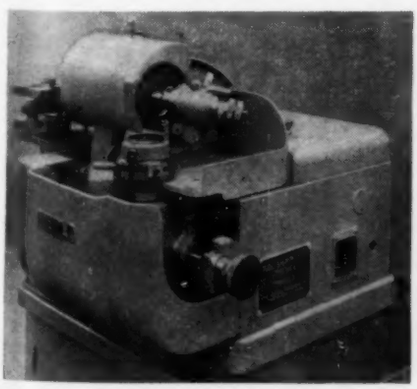
148MJ1

Shop Equipment News

Control settings make possible different rates of "in" and "out" feeds when two-way boring is required on Bore-matics

Line of Bore-Matics by Heald Furnished with Multi-Way Units

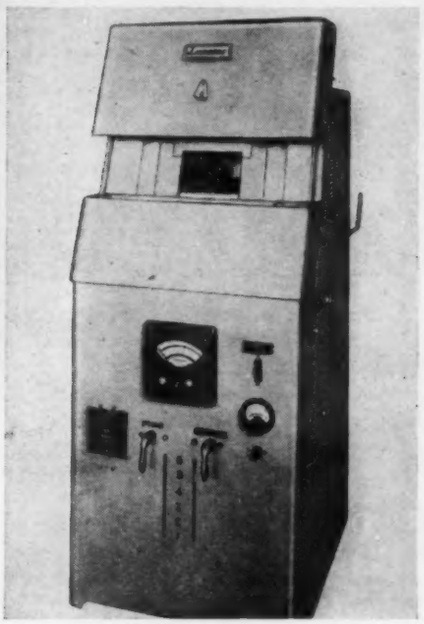
Multi-Way Bore-Matics made by The Heald Machine Co., Worcester 6, Mass., as part of their new line of machines, are furnished as a Bi-Way in two sizes, Models 232 or 332, and as a Tri-Way in two sizes, Models 233 and 333. Machines are designed for work on two or more holes simultaneously from various directions. Up to three individual boringheads or a special multi-spindle head unit can be installed on each "way unit." "Way units" can be operated separately if desired.



Scales are provided for setting of clearance angles, side angles, radius and off-center adjustment on the Heald tool sharpener

The Bore-Matics include all features of the new Heald line, such as improved idlers, cylinders, motor and pump units isolated from base, and other developments. Machines are said to be capable of boring, turning, chamfering, facing, grooving and fly-cutting operations. Operations can be either finishing only, or both roughing and precision finishing in one setting.

The Model 2 tool sharpener is also announced by Heald, and is designed to automatically lap sharp edges to the correct shapes. After adjustment for desired shape of tool, operator inserts the tool in the holder, flicks the switch, and the tool is sharpened automatically. Odd shaped tools can be finished on an off-hand grinding attachment using a fine-grit diamond wheel. The tool sharpener can be provided with a coarse wheel for roughing tool surfaces before finish grinding.

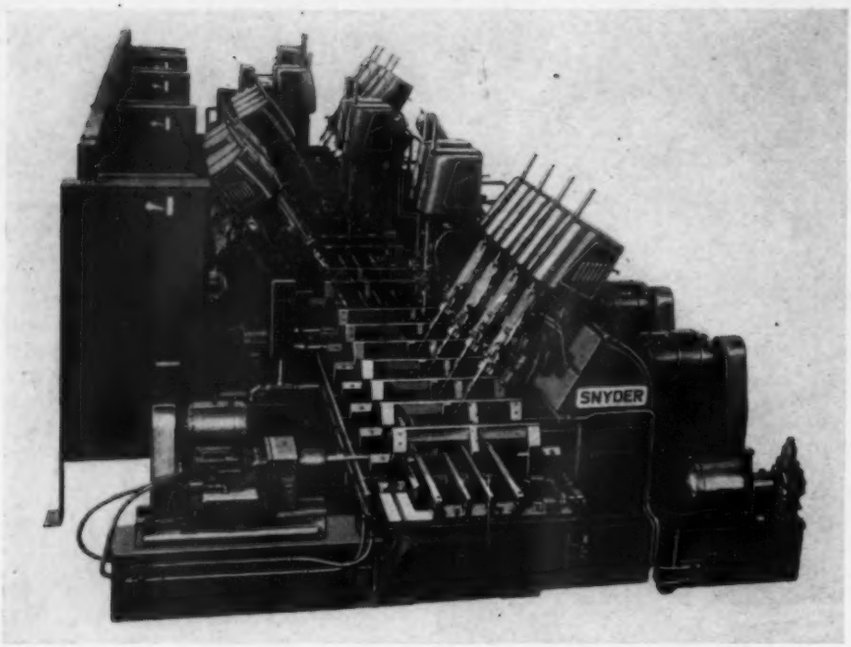


Lindberg Laboratory Furnace Heats to 3000 F., is Box Type

A box-type laboratory furnace with temperature up to 3000 F. top heat, and for continuous operation as high as 2500 F., is offered by Lindberg Engineering Co., Laboratory Furnace Div., 2444 W. Hubbard St., Chicago 12, Ill.

Unit is self-contained and can be used as a muffle furnace or with carbon blocks for non-oxidizing atmospheres. Ten silicon-carbide Globar heating elements are said to insure uniform heating.

Furnace temperatures are regulated by an indicating-controlling pyrometer with electronic circuit. Model G-10 operates on 230 v., 60 cycle, single phase. The variable voltage transformer contained within the unit has a capacity of 8 kw. and is used with the two tap switches, each of which have six control points for voltage regulation.



Snyder Tool's Automatic Machine Drills Oil Holes in Crankshafts

A special automatic machine for drilling oil holes in steel crankshafts is introduced by Snyder Tool & Engineering Co., Detroit, Mich. Machine automatically indexes work pieces past a series of self-contained automatic vertical, horizontal and angular machining units. Units drill and deep-drill oil holes as well as drill and ream two welch plug holes in the cranks. Production is said to be 60 cranks per hr. at 80% rated efficiency.

Work pieces are loaded at one end of the machine and shuttled through 28 stations by an index bar. Pieces are positioned and clamped automatically. Twenty-four Avey standard deep-hole units and eight horizontal units are used. Avey spindles automatically retract when drills are overloaded through excessive chip accumulation or variations in metal hardness. Space is provided at all stations for changing tools.

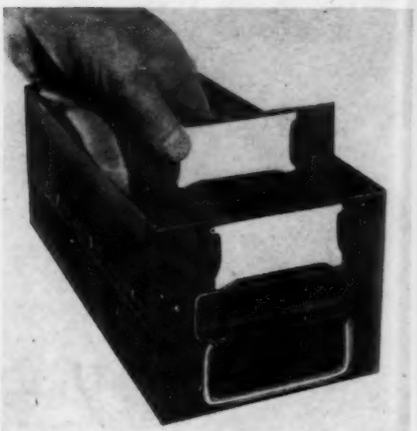
Chips are collected by a conveyor travelling the full length of the machine. Coolant is supplied from a central system. Machine is approximately 39x18 ft. The drilling and reaming units for four crankshaft drilling machines are mounted on one base therefore reducing required floor space.

SHELF BOXES for storing bolts, nuts and other small parts are equipped with label holders on front for identification of contents. Boxes are furnished in baked green finish and come in a variety of sizes. Boxes are furfactured by Bay Inc., 30 N. 16th St., Philadelphia 32, Pa.

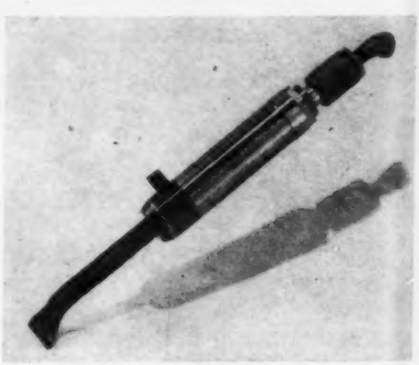
Model B Velocity Power Driver Explodes Cartridge for Power

The Model V velocity power driver developed by Mines Safety Appliance Co., Pittsburgh 8, Pa., anchors pipe hangers and conduit boxes to structural plate or concrete. Threaded or headed studs are driven instantaneously. This tool is applicable for heating and ventilating ducts, signs, guard rails and similar work. Studs imbedded by the driver are said to withstand tensions of thousands of pounds.

The driver weighs 4½ lb. It is self-contained and can operate in any position independent of cables, or outside sources of power. Operation is said to be comparatively silent, flashless and without recoil. Energy contained in a small blank cartridge supplies the power.



ADJUSTABLE COMPARTMENT shelf drawers for handling and storing small parts are made by Bay Inc., 30 N. 16th St., Philadelphia 32, Pa. Boxes are slotted to accommodate dividers. Back stop prevents drawers from accidentally dropping. Drawers are available in baked green enamel in packages of 10 to a carton

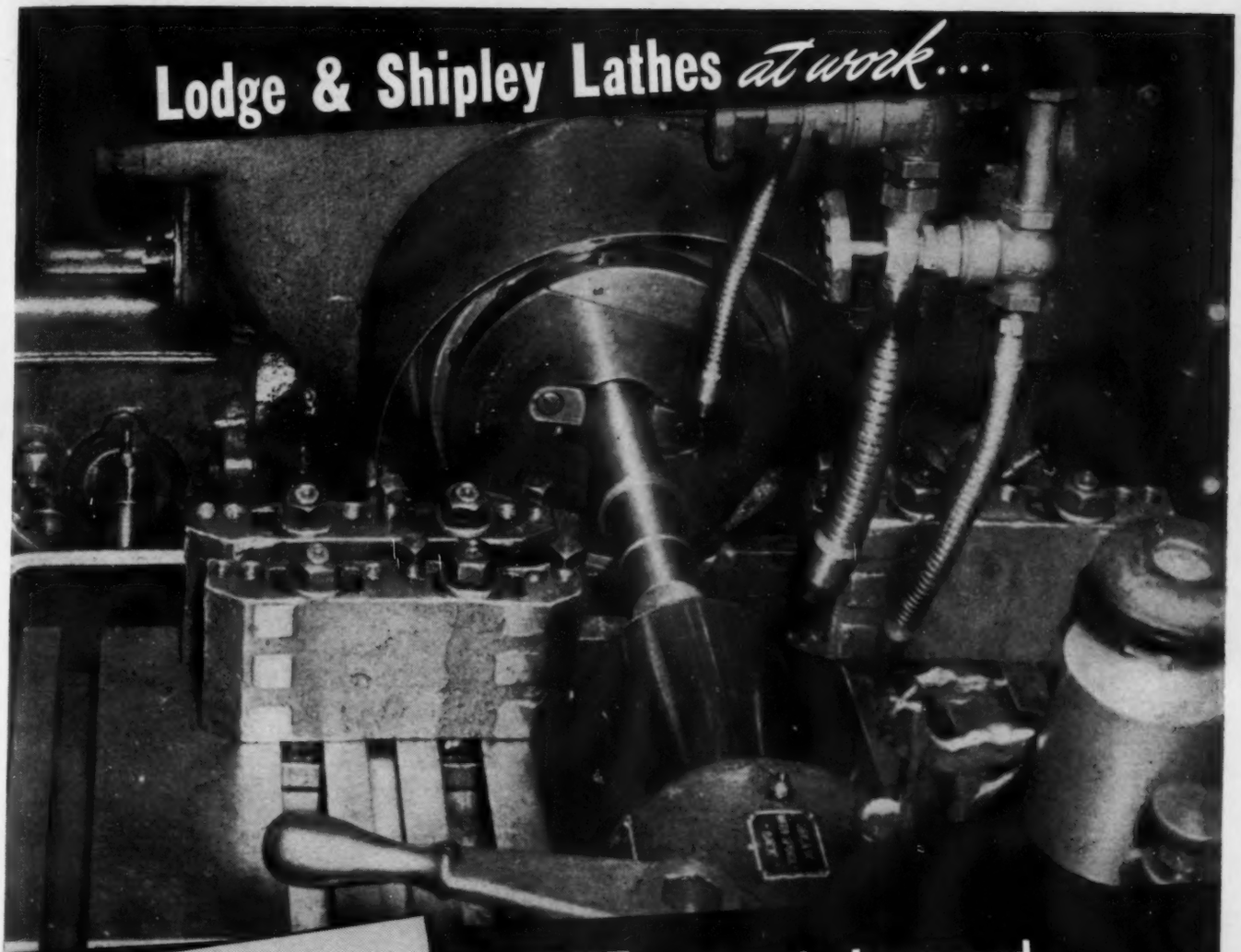


Control on Scaling Hammer Permits a Choice of Blows

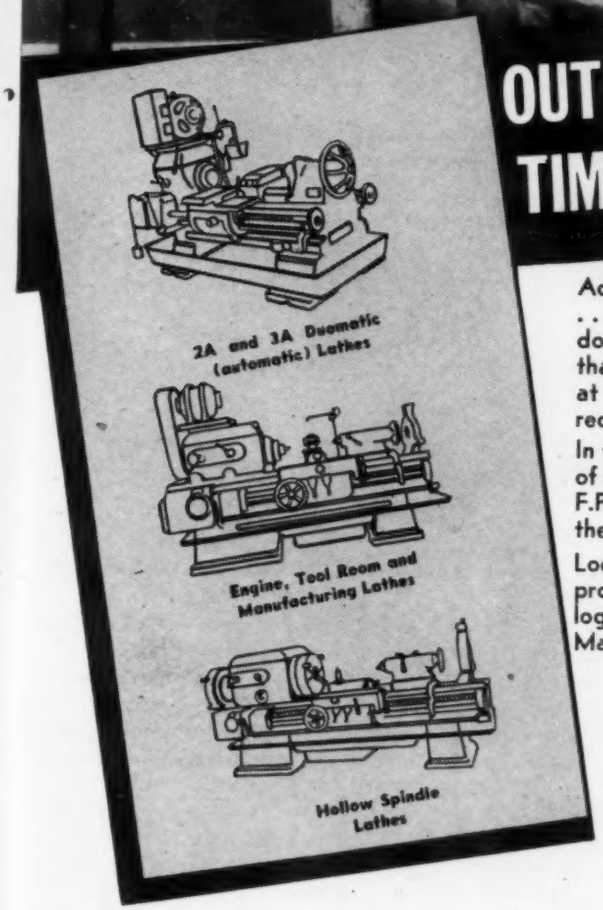
A scaling hammer, with a graduated control in the throttle giving a choice of blows delivered, is offered by The Rotor Tool Co., 17325 Euclid Ave., Cleveland, Ohio. The tool can be used for weld-flux scaling, weld-spatter removal, paint scaling, rust removal and many other applications.

Exhaust air cleans the chips and scale. A chisel retainer allows removal of chisel by thumb pressure. A square broached hole in the nose is said to eliminate nose bushing and guides the chisel at all times. Chisels are furnished in blank, flat and spoon form. Star drills are available in sizes ranging from 3/16 to ¾ in.

Lodge & Shipley Lathes *at work...*



OUTPUT... Greatly Increased
TIME SAVED... 15 Minutes per part



Adding another chapter to Lodge & Shipley's production record . . . here's proof in the owner's words: "Lodge & Shipley Lathes have done a very efficient job for us . . . maintenance is low in cost." And that's just part of the story of Lodge & Shipley Lathe performance at the Philadelphia plant of Link-Belt Company, producing speed reducers.

In the illustration, a 3-A Duomatic (automatic) Lathe is turning a shaft of heat-tempered steel with carbide tools. With a surface speed of 300 F.P.M. and .014 feed, (output increased and easier to hold accuracy) the time saved on each part is 15 minutes over former lathes used.

Lodge & Shipley Representatives will be glad to show you additional production records and performance data. Send for condensed catalog describing Lodge & Shipley Engine, Tool Room, Oil Country, Manufacturing, Duomatic, Gap and Turret Lathes.

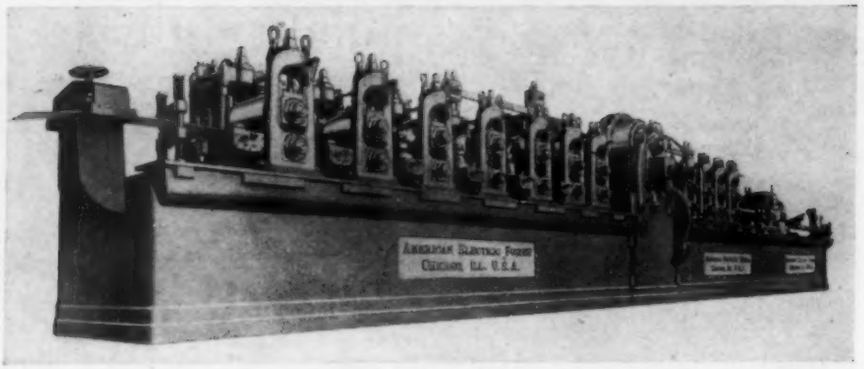
THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

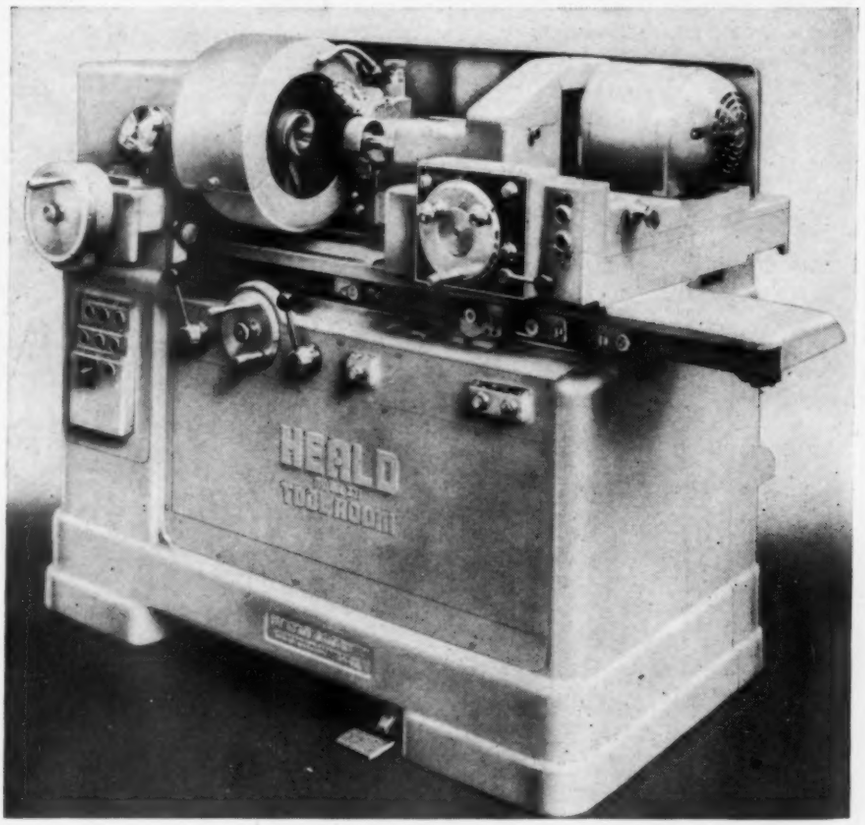
Leach 6x12-in. Surface Grinder Equipped with Two-Speed Spindle

A compact, self-contained 6x12x 10½-in. surface grinder is offered by H. Leach Machinery Co., Providence, R. I. Unit has a two-speed ball-bearing spindle, and the motor is driven by a ¾-hp. motor. Grinder features standard 5x10-in. magnetic chuck, 7x½x1¼-in. wheel, standard wheel adapter leaving ample clearance room, and dust guards. Hand operating wheels are centrally located.

MULTIPLE straight-line stamping of letters and figures is accomplished by a marker made by New Method Steel Stamps, Inc., 147 Jos Campau, Detroit 7, Mich. Lines of type are interchangeable. Individual type is set into holder in same way as type is set in a print shop. Each piece is slotted so that entire row of monotype and spacing slugs can be held with a flat locking pin. It is available in variety of sizes and type capacities



MILL for converting strip into standard weight pipe is announced by American Electric Fusion Corp., 2600 Diversey Ave., Chicago 47, Ill. Mill transforms coils of flat strip into electrically welded pipe at speeds to 65 ft. per min. depending on diameter. Diameter sizes range from ½ to 2 in. Operation is automatic and includes forming welding, scarfing, sizing, straightening and cutting pipe to length in continuous production



Heald Model 271 Internal Grinder Embodies A Swivel-Type Workhead

The Model 271 toolroom internal grinding machine offered by The Heald Machine Co., Worcester 6, Mass., embodies all the features common to the new Heald line. Machine is said to be adaptable to a large variety of parts and range of sizes. The workhead can be swiveled providing a wide angular capacity for tapper work. A sine bar attachment for high precision settings can be applied. Its semi-automatic grinding cycle makes it possible to handle small-lot production runs. Quicker setups are said to be possible by fingertip adjustment of dogs, cross feeds and table speeds. No wrenches are needed.

Mold cavity made from Bethlehem Tool Room (BTR) for plastic lamp bases produced at the rate of 60 per hour by Molded Insulation Company, Philadelphia. Average pressure: 500 psi; average temperature: 500 F. The polystyrene bases are molded exclusively for the Standard Business Machines Company, Chicago, makers of the attractive desk lamp shown.

An easy-machining Tool Steel for Molds

Bethlehem Tool Room (BTR) is a natural choice for the mold-maker because it's an easy-machining tool steel with plenty of other important advantages:

★ Heat-treats readily with minimum distortion.
★ Safe-hardening (1475 F, oil-quench).
★ Deep-hardening for high pressures.
★ High wear-resistance for long runs.
★ Produces a clean, highly-polished surface.

BETHLEHEM STEEL

TYPICAL ANALYSIS:

C	Mn	Cr	V	W
0.90	1.20	0.50	0.20	0.50

NORMAL WORKING HARDNESS: 58 TO 62 ROCKWELL C

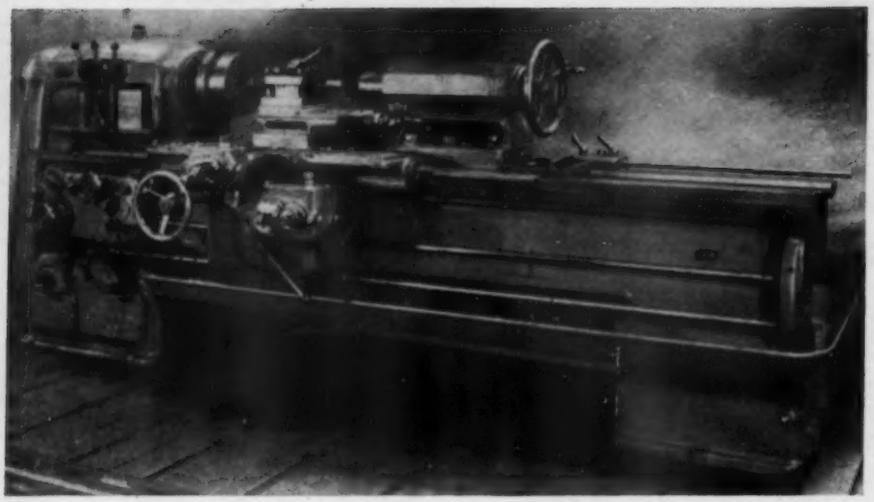
Specify BTR for machine-cut molds and dies. You'll get long runs and top-quality finishes with this easy-machining, high-strength tool steel.

Plan now to get full details about Bethlehem tool steels for both machining and hobbing.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

B T R . . . one of Bethlehem's fine tool steels



Feed Releasing Boxes on Skoda Lathe Lessen Time for Checking Dimensions

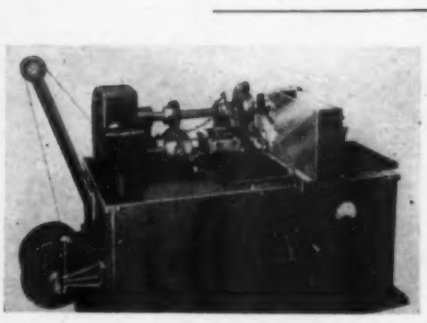
A heavy-duty lathe, with a feed releasing box attachment designed to cut time in measuring and checking dimensions, is developed by Skoda Works, Czechoslovakia, and marketed by Industrial Operations, Inc., 381 Fourth Ave., New York 16, N. Y.

The lathes have a speed range of 1:130 and are said to remove to 250 lb. of chips per hr. Feed releasing boxes are installed as special equipment on four of their engine lathes of medium size, the SUR 260, 300, 350 and 400. One box sets the length; the other the diameter, thus changing the engine lathe to a production lathe.

The equipment does not work on a copying principle. Setting is made directly from the blueprint. One setting is sufficient for roughing, finishing, multiple turning and for longitudinal and cross-feed work. Tolerances of ±0.0008 mm. in length and ±0.0004 mm. in diameter are said to be maintained. Turning a knob to an off position disconnects the apparatus.

Using this equipment and a carbide cutting tool, the time for machining a shaft 18 in. long with four varied diameters, each held to three decimal points in tolerance, was claimed to be reduced from 36 to 7 min.

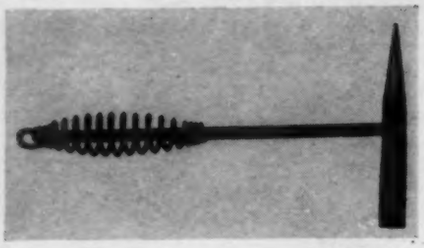
The four lathes mentioned above have 32 spindle speeds and have a maximum turning diameter over bed in mm. of 550, 630, 740 and 840 respectively. They also have a center height in mm. of 260, 300, 350, and 400 respectively. All shafts run in anti-friction bearings.



Automatic Welding Equipment Attaches Tabs to Tube Cathodes

A machine for welding and shaping light, small parts difficult to process manually has been developed by Tweezer-Weld Corp., Newark, N. J. Equipment welds automatically by means of an electronic welding and timing device. Assemblies or small parts are fed to a turret either by hand or automatically from a suitable hopper.

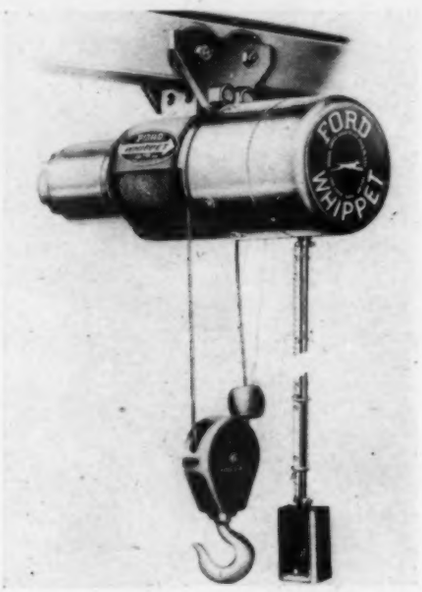
The machine will attach light wire from a spool to parts fed automatically. It will also weld tabs to radio tube cathodes, and can produce approximately 3,000 cathode assemblies per hr. without the use of an arbor. Equipment will handle round and flat cathodes from 0.020 in. O.D. to 0.125 in. O.D., lengths from ⅝ to 2½ in and tab wire as fine as 0.002 x0.006 in. The machine will also automatically trim off fluorescent-light starter-stem leads as well as forming, welding, and cutting the bi-metal used.



Chipping Hammers by Atlas Incorporate Flex-o Handle

An improved line of chipping hammers is offered by Atlas Welding Accessories Co., 707 E. Lewiston, Ferndale (Detroit), Mich. The hand-forged heads are now drilled halfway through and have the handles silver brazed into the hole.

The end of the handle is machined to fit the base of the drilled hole allowing the silver to flow over entire surface of hole cementing the handle to head. Flex-o handle, offering a coiled-wire design, is featured for slip-proof, sting-proof grip. It is said to eliminate the danger of burning and breakage.

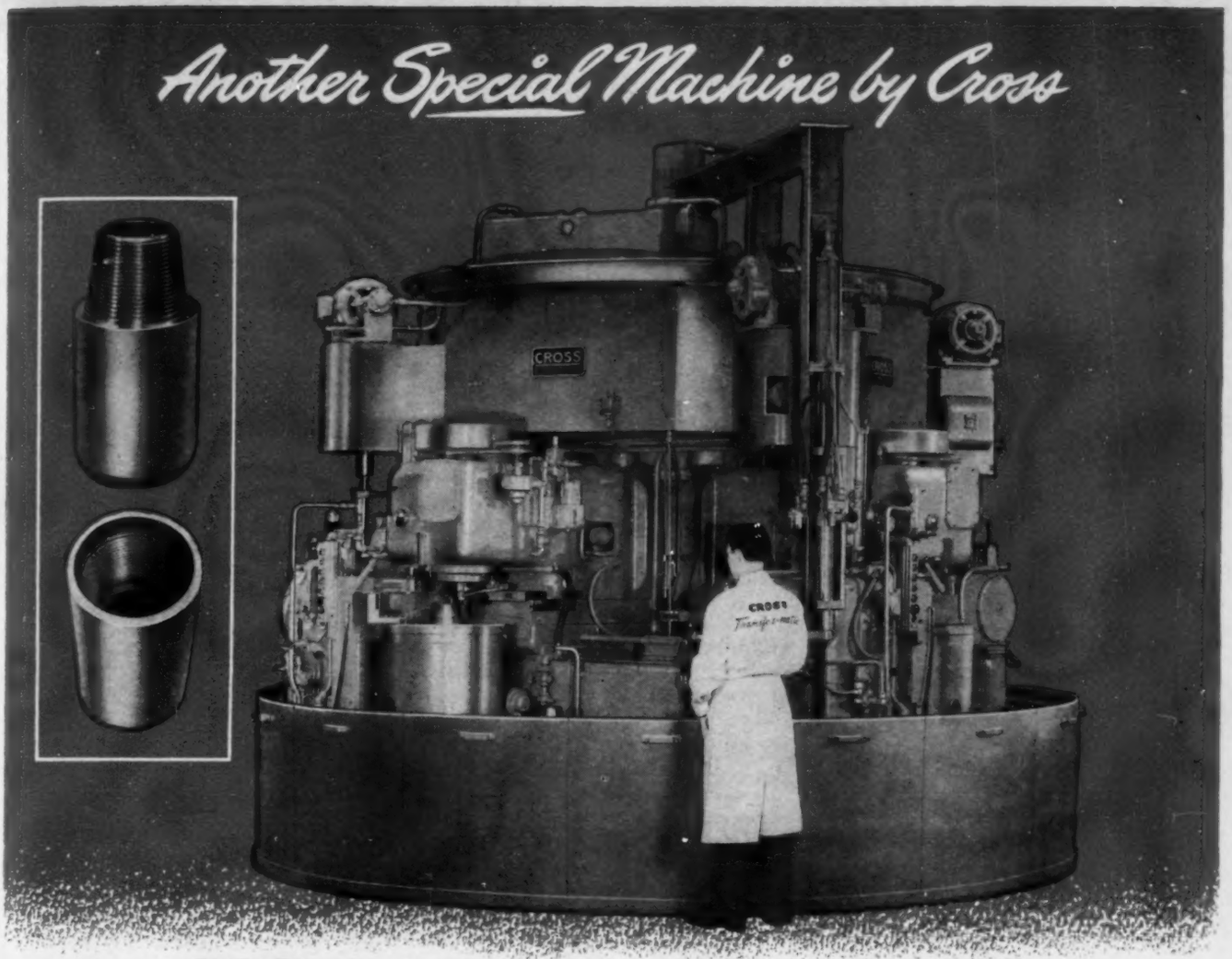


Ford's Whippet Electric Hoists Lift from 250 lb. to 2000 lb.

A line of electric hoists named Whippet is announced by Ford Chain Block Div., American Chain & Cable Co., Inc., York, Pa. Hoists can be furnished with trolleys, either parallel or cross mounted, and supplied for hook suspension or for rigid or bolt suspension.

Capacities range from 250 to 2000 lb. Standard lift is 12 ft. Lifts of 20 ft. can be furnished. Whippet hoists feature pushbutton control, preformed wire rope, grooved drum.

Another Special Machine by Cross



Milling 300 S.F.M. With High Speed Steel Cutters

This modern Four-Station Thread Milling Machine increases Oil Well Tool Joint production per man hour—4 for 1. Accuracy and surface finish are improved proportionately—even beyond exacting requirements previously established.

The operator merely unloads, loads, and presses a button, no unnecessary movements being required. Four pieces of work are finished with each rotation of the machine. Output at a high rate of efficiency is assured because *the machine sets the pace* for the operator.

Precision bearings, large flywheels on the cutter spindles, preloaded work spindles, and climb milling are responsible for the high cutting speed of *300 surface feet per minute—with high speed steel hobs.*

This machine is additional proof that it pays to "Consult Cross to Cut Costs."

PART: Tool Joint.
MATERIAL: SAE 4140 Steel.
OPERATION: Mill internal or external tapered thread, 3" taper per foot, five threads per inch.
PRODUCTION: 40 of either part per hour at 80% efficiency.
EQUIPMENT: Cross Four-Spindle Universal Rotary Thread Milling Machine.
FEATURES: ☆ Continuous automatic cycle paces production ☆ Cutting four pieces at a time progressively ☆ Flexibility for milling internal or external threads ☆ Cam controlled infeed, outfeed, and taper ☆ Servo controlled hoist for loading and unloading ☆ Climb milling ☆ Heavy duty precision bearings ☆ Hydraulic work clamping ☆ Vibration control with individual suspension for each station ☆ High cutting speed—300 surface feet per minute ☆ Capacity for milling Tool Joint sizes from 3½ to 5⁹⁄₁₆.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE **CROSS** COMPANY

Established 1898

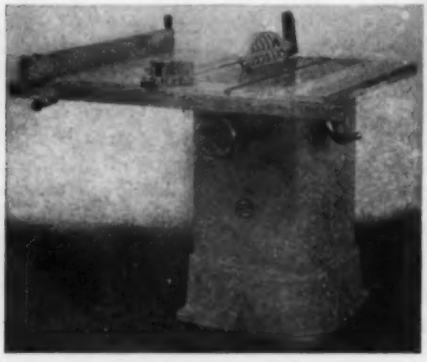
SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

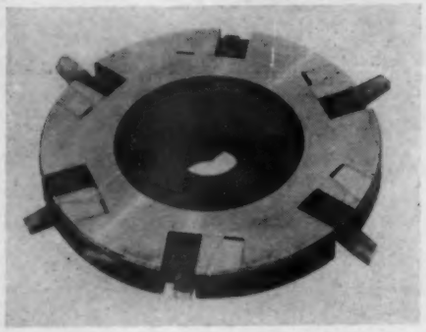
Puller With Safety-Load Handle Will Bend Before Breaking Point

Coffing Hoist Co., Danville, Ill., announces the Mighty Midget puller designed to pull or lift 500 lb. Chain has a tensile yield of 2,000 lb., and its snap hooks, a tensile yield of 3,000 lb. A safety-load handle is designed to bend at about 800 lb., a level well below the yielding point of any other part of the puller. Weighing 6½ lb., the puller features a two-way handle that can be used as a high-speed crank or a ratchet lever. Puller can be used to pull wire on long-span construction, for raising messenger cable and for lifting equipment.



Foster Tilting Arbor Saw No. 95-C Offers Self-Indexing Miter Gage

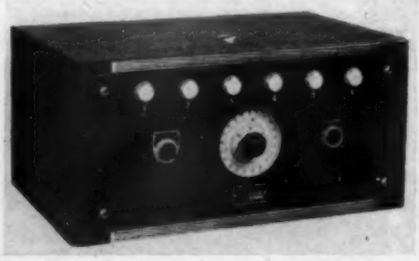
A tilting arbor saw is introduced by Foster Mfg. Co., One Kinsey Ave., Buffalo, N. Y. Listed as No. 95-C, it is equipped with a self-indexing miter gage. Fence saw guard and extensions are made of cast aluminum. A ¾-in. arbor will accommodate dado heads up to 1 1/16 in. Capacity of unit is 12x¾x34 in.



Kendall Fly Cutters, Face Mills Perform Straddle, Form Milling

A series of fly cutters and face mills made to fit conventional arbors and standard American spindle nose drives of milling machines, is introduced by Kendall Corp., 2357 N. 29th St., Milwaukee 10, Wis. Listed as the Kendall series, the design embodies hexagon-shaped toolbit holders to permit angular setting of toolbit and positive locking means to maintain this setting. Angular setting of toolbit holder is also maintained when toolbit is removed for grinding.

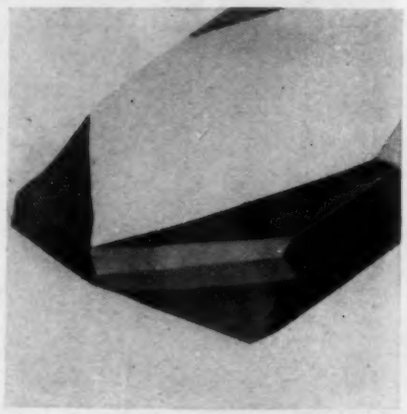
Separate toolbits can be ground and individually positioned to do a portion of a job, therefore combining a number of complicated cuts in a single operation. Cutter can be used for fly cutting, slotting, surface milling, straddle milling, form milling and other types of machining. Three sizes, 6-, 8-, and 10-in., are available.



Surface Combustion Corp. Selector Analyzes Gases in Timed Sequence

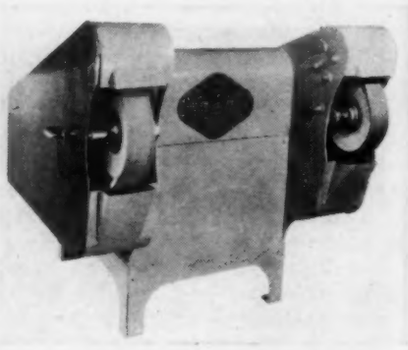
An atmosphere selector for atmosphere gases is announced by Surface Combustion Corp., Toledo 1, Ohio. The unit is said to increase the effectiveness of their dew-point recorder by enabling it to analyze consecutively atmosphere from as many as six different sources, including generators and furnaces, in timed sequence.

The selector consists mainly of a six-way valve for six incoming atmosphere sources, as well as a motor and electric time clock. At a preset time the source of atmosphere supply to the dew-point recorder is automatically switched from one line to the next. The remaining lines are continuously purged, allowing the following source to be analyzed with no time lost in purging. Pilot lamps on the control panel indicate source being analyzed. Atmosphere selector is enclosed in a cabinet approximately 21x13½x10½ in. A door on top of the cabinet allows access to the interior.



Super Tool Co. Carbide Tips Drill Holes in Hardened Steel

A line of standard carbide-tipped drills designed for drilling holes in dies, fixtures and similar work after the metal has been hardened is marketed by Super Tool Co., 21650 Hoover Rd., Detroit, Mich. Tools must be kept sharp and are fed by hand. They can be used either dry or with coolant.



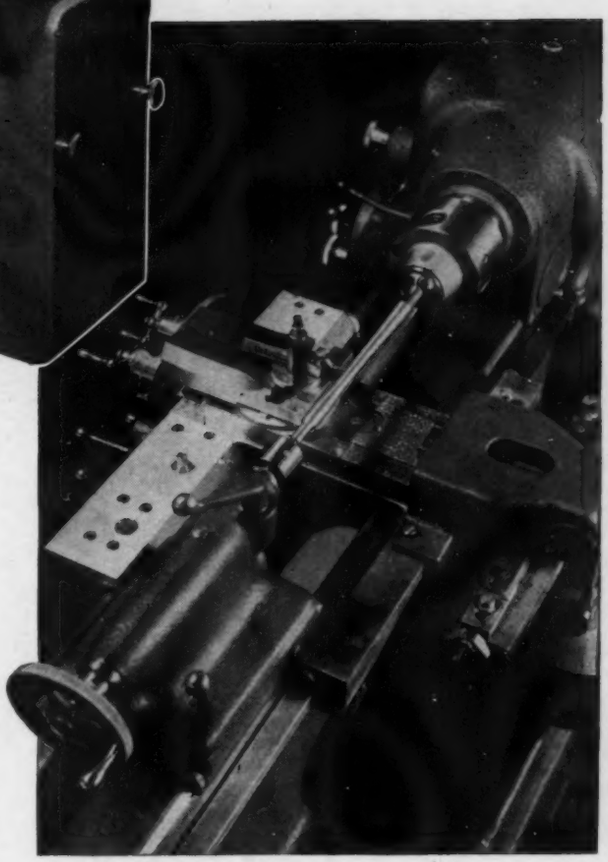
POLISHING LATHE with two backstands and two exhaust hoods is known as the Bright Finisher. Made by Crown Rheostat and Supply Co., 3465 N. Kimball Ave., Chicago 18, Ill. Side plates open for changing belts. Handwheel regulates tension of abrasive belt. Adjustment screws are provided for belt alignment. Distance between wheels is 39 in. Floor space required is 60x64 in. Unit takes abrasive belts to 6-in. wide

More than a mere Manufacturing Lathe

If you're searching for ways to make your production dollar go farther, we believe you'll be particularly interested in this Monarch 10" Precision Manufacturing Lathe. Why? Because you'll get plus values on your investment, through the versatility of the machine—values that make Monarch the outstanding buy in its class.

In addition to its ability to deliver rapid production of small diameter work—and spindle speeds up to 5000 rpm permit utilization of carbide-tipped tools for maximum production—it is equally suited to a wide variety of more specialized jobs, of which the metering pin illustrated is just one example. Here a bed-type forming attachment increases the range of jobs this standard 10" Precision Manufacturing Lathe can handle—*profitably*.

For metal-turning capacity *plus*, it will pay you to investigate Monarch Lathes. We're anxious to give you more complete details, interpreted in terms of your specific needs. May we hear from you?



Turning metering pins on a standard Monarch 10" Precision Manufacturing Lathe equipped with one of numerous available standard accessories, a bed-type forming attachment. Actuated by a hardened and ground template, the tool forms a surface which blends from a straight section at the tailstock end, into a radius, then into another straight section which blends into a decreasing taper and, finally, into an increasing taper.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

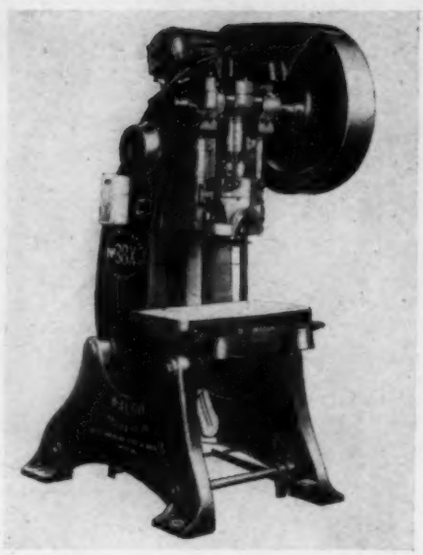
FOR A GOOD TURN *FASTER* —— TURN TO MONARCH

American Optical Safety Goggle Employs A Single Plastic Lens

A lightweight, safety goggle with an all-plastic frame and a single plastic acetate lens is introduced by American Optical Co., Southbridge, Mass. Listed as AO 607, the goggle can be worn directly over eyes or over spectacles for frontal protection against flying particles. The brown plastic frame provides unobstructed side vision. The goggle is available with either green or white lens color, and is replaceable. The metal temples are enclosed in acetate to prevent corrosion. Goggles are supplied in a leatherette case.

Hobart Electrode Softcast A Deposits a Non-Ferrous Weld

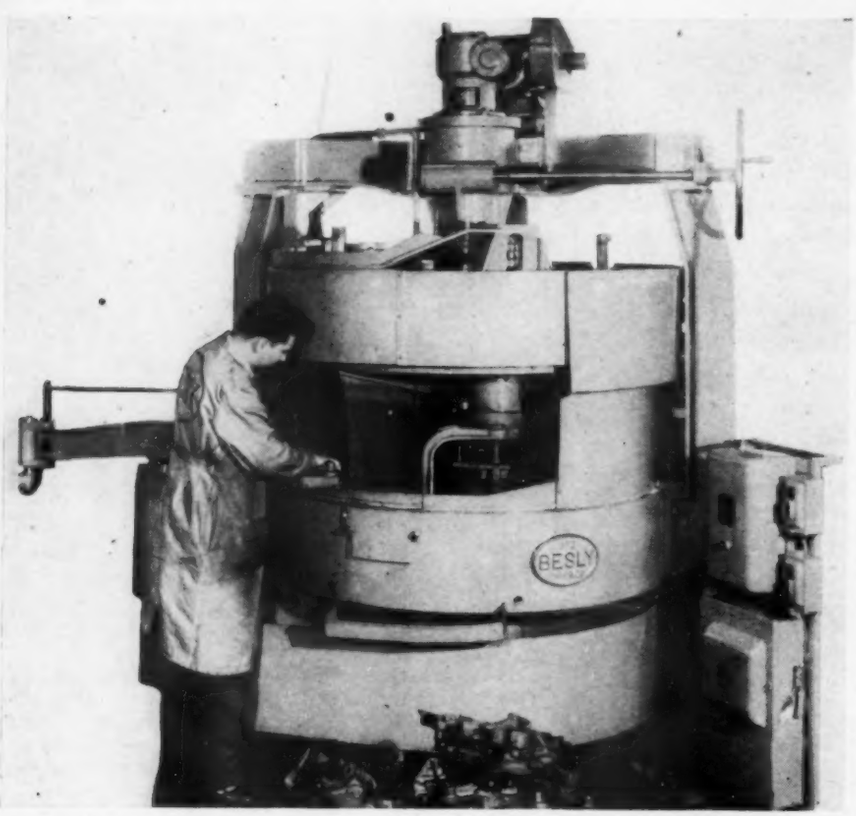
A copper-nickel alloy electrode with a mineral flux coating for metallic arc welding is offered by The Hobart Brothers Co., Hobart Square, Troy, Ohio. Called the Hobart Softcast A, its deposits are non-ferrous, light grey in color, malleable, machinable, and have a tensile strength said to equal good cast iron. Electrodes are said to be adaptable to the welding of cast iron where the weld area must be machined, drilled or tapped anywhere in the weld zone. Available in 3/32-, ⅛-, 5/32- and 3/16-in. dia. in 18-in. lengths, center brushed.



Walsh Inclinable Punch Press Offers Variable-Speed Drive

An inclinable punch press with an open back is announced by Walsh Press and Die Co., Div., American Gage and Machine Co., 4709 W. Kinzie St., Chicago 44, Ill. Press has a capacity of 38 tons and is equipped with a variable-speed drive. Model 38X can be used as a toolroom and test-run press, or for production.

In the toolroom the press can be used for shearing-in of dies and punches and for die try outs. Press is said to show up material failure. Because of the large shut height and bolster-plate area, machine can be adapted to certain notching, forming and die-casting trimming operations where plenty of room is necessary. The press has a distance between gibs of 17 in., a bed area of 18x26 in., and a throat depth of 12 in., and is available with a stroke to 6 in. Either flywheel type or back-geared type with variable-speed drive or conventional motor drive can be furnished.



VERTICAL-SPINDLE GRINDER, listed as No. 372-72 in., features a power-driven rotary fixture into which the casting is placed. Rotating fixture and revolving work holders carry the castings through the grinding cycle at a speed of 1 rpm. Four pieces are ground simultaneously, removing approximately 1/32 in. When smaller castings are ground, two or more can be placed in each work holder. Made by Chas. H. Besly and Co. 118-124 N. Clinton St., Chicago 6, Ill., the 72-in. grinder was designed for grinding cast-iron gear housings

Flux-Coated EutecRod 14 FC Welds Gray, Alloy Cast Iron

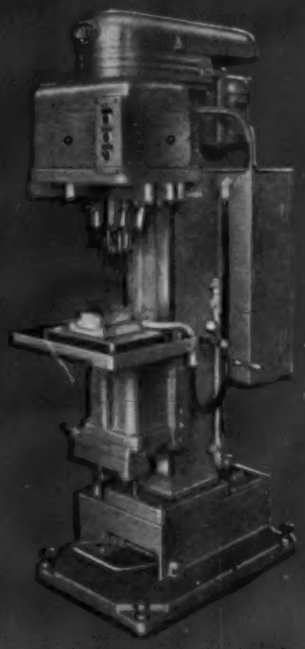
EutecRod 14 FC, a color-matching flux-coated torch welding rod, is offered by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. It is designed specifically for all types of gray or alloy cast iron. It is said to eliminate the delays of manual fluxing when welding stressed cast shapes. The rod is said to develop a tensile strength of 48,000 psi., in weld deposits, bonding at 950-1400 F., with a remelt temperature of 2200 F. Its coefficient of expansion is the same as gray cast iron, and its hardness is approximately 190 Brinell.

Investigate NATCO *first...* for the "HOLE" story in Light Sensitive High Production Drilling or Tapping

A complete line of close control, high speed machines for sensitive drilling or tapping multiple holes in small work in cast iron, steel, aluminum, plastic or wood.

A-33A Combination Hand and Foot and Air Oil Feed Machine for both light precision drilling and tapping.

A-33B Air Feed Machine used preferably for light precision tapping. A-33A & A-33B machines available with or without air operated rotating table.



G-5 Arranged with 12 spindles for drilling and tapping small or medium sized work. Hand & foot or hydraulic feed tables.

G-6 Similar to G-5 except has larger head area, 24 spindles and 3HP head drive motor and larger work table.

Write today for details on the A-33 Bulletin 247 and G-5 and G-6 Bulletin 522

NATCO DRILLING, BORING, TAPPING and FACING MACHINES

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.

Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

Call a Natco Field Engineer

G-R Correct-Arc Auxiliary Unit Featured for Inert-Gas Welding

An auxiliary unit used with ac. welders for inert-gas welding with Heliarc torches has been developed by Glenn-Roberts Co., 2107 Adams St., Indianapolis 18, Ind. Called G-R Correct-Arc, the unit incorporates a high-frequency circuit to start and maintain the arc without contact between work and electrode.

The unit also has a filter-choke circuit which reduces rectification effect of the inert-gas arc. This feature is said to reduce the causes of overheating, excessive input, reduced input and low power factor. Use of the Correct-Arc for inert-gas welding is said to provide virtually the same output range as the welder exhibits on regular metallic arc welding.

Correct-Arc is available in two sizes with maximum capacities of 300 and 600 amp. respectively. Units can be paralleled for welding at higher than 600 amp.

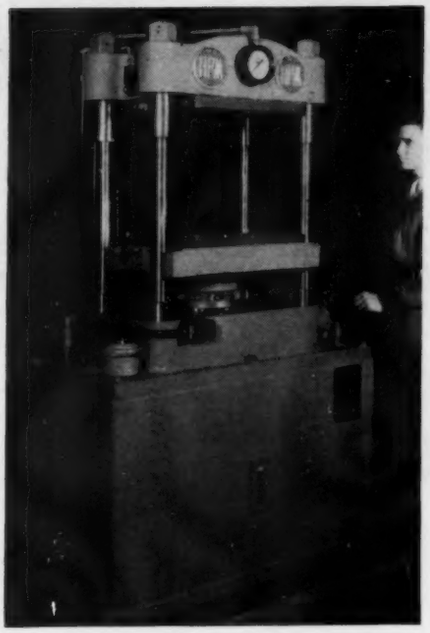
Westinghouse Electrode Made to Eliminate Underbead Cracking

A hydrogen-free, mineral-type, extrusion coated electrode said to eliminate underbead cracking is offered by Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa. Called the Flexarc LoH, the electrodes are available from ¼- to ⅛-in. dia., and are recommended for use with ac. and also for dc. reverse polarity.

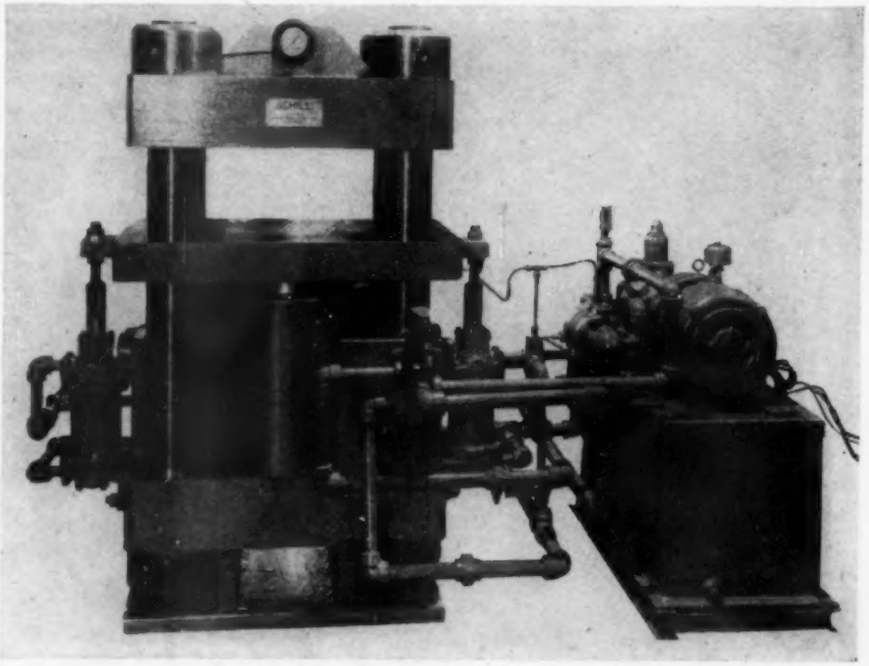
Included in its applications are welding high carbon steels, and welding high-carbon to low-alloy steel. Electrodes require lower arc voltages than the E-6010 or E-6020 mild-steel electrodes and use slightly higher current values.

Bay's Tool and Work Stand Employs Reversible Shelves

Tool and work stand made with heavy-gage steel shelves is announced by Bay Inc., 30 N. 16th St., Philadelphia 32, Pa. Furnished in olive green with a choice of two or three reversible shelves, unit can be used with operating equipment, and for carrying portable inspection equipment as well as other uses. It is 30 in. high without casters. Other dimensions are 30x18 in.



UPWARD-ACTING hot plate 50-ton press is made by The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, for laboratory or small-production pressure processing where heat is required. Self-contained hydraulic power unit is lever controlled. Adaptable to steam or electrical heating, machine has two 20x20x1⅛-in. hot plates for the handling of laminating and curing work.



ALL-STEEL 400-ton hydraulic die-hobbing press is made by Edward Franklin Schill Corp., 39 Cortlandt St., New York 7, N. Y. A 4-rod press, it has an upmoving ram with a stroke of 6½ in., and a daylight opening of 12 in. Clearance between strain rods is 22 in. right and left, and 8 in. front to back. Stroke control is from ¾ in. to full stroke of 6½ in. Press is manually operated. Free closing speed is 75 ipm. while opening speed is 150 ipm.

FOR A *New Thrill* IN SHEARING . . .

Series No. 410 Shear for cutting steel plate up to 3/8" x 10'-0"

The electric foot switch is one of the many features that makes operation of Steelweld Shears easier and faster. It can be slid around the floor to wherever most convenient. Only a slight movement of the toe is required to operate it. This feature is standard on all Steelweld Shears, and is furnished at no extra cost.

TRY STEELWELD *Pivoted-Blade* SHEARS

REGARDLESS of what shears you have ever operated, in Steelweld Pivoted-Blade Shears a new thrill is in store for you.

Like a modern streamlined engine as compared to an old-time locomotive, or a luxury liner versus a tramp freighter, so will you find these new shears as compared to all power shears you have ever used before.

Here at last is something new in shearing history — a great advancement in design and performance — the only truly basic change for many decades.

Not only are these new shears easier to operate but their design assures smooth straight cuts to hair-line accuracy for years of operation. Their construction is extra heavy and all modern features are incorporated to provide for ease of operation, minimum maintenance and long life.

If you shear plate in any thickness to 1¼-inch or length to 18 feet, you should get the facts on these new Steelweld Shears. Send for catalog today.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
1401 EAST 282nd ST. *WICKLIFFE, OHIO*

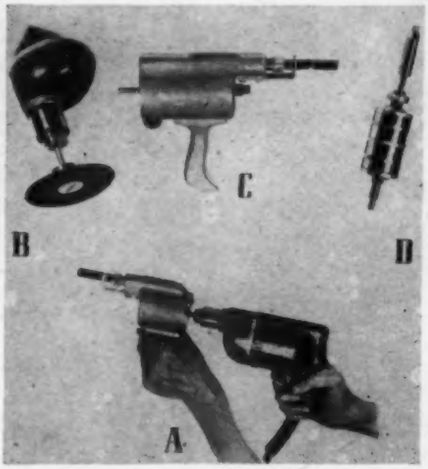
STEELWELD PIVOTED BLADE SHEARS

Automatic's Skylift Brawny Truck Lifts 6000 lb. Loads to 124 in.

A fork truck, the Skylift Brawny, for handling loads of 4000 to 8000 lb. is marketed by Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill. Featuring the Newmatic controller, which functions as the electric counterpart of automotive automatic gearshift, it also incorporates Automatic's high-pressure hydraulic system, and silicone insulation.

The 4000-, 5000- and 6000-lb. trucks lift to 124 in., and have a standard collapsed height of 83 in. The 7000- and 8000-lb. models lift to 115 in.

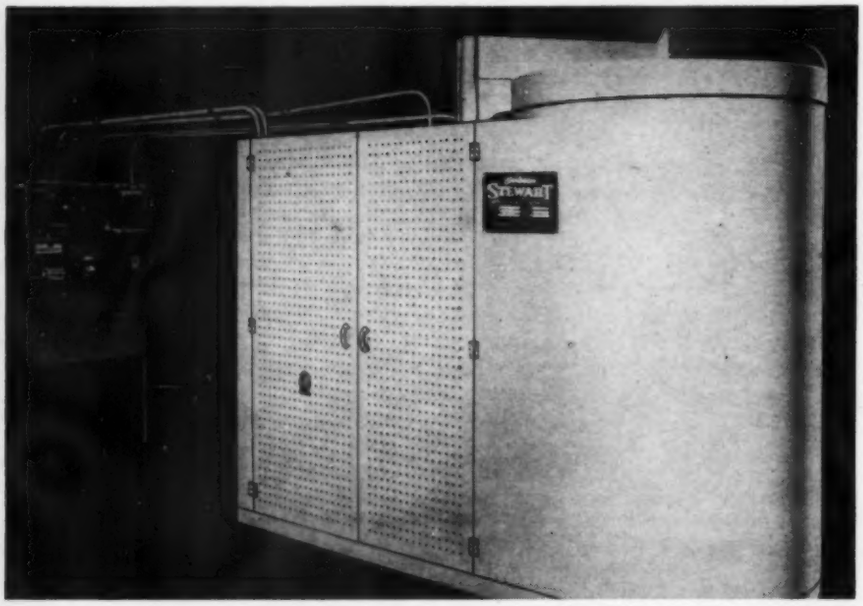
The telescopic action of the hydraulic lift functions so that the forks and uprights are raised independently by separate rams the forks raise to 62½ in. before the uprights begin to extend.



Whittle's Portable Attachments Permit Versatility of Hand Drill

Four interchangeable attachments made by J. D. Whittle Co., Small Tools Div., 208 N. Wells St., Chicago 6, Ill., Dept. AM-1 for electric hand drill and drill press enable sanding, polishing, grinding, filing and sawing of wood, steel, plastic and other similar materials, utilizing the same power unit. Light in weight, units have no gears or crankshafts.

Saw and file attachment *A* is for hand drill only. It converts spinning motion into forward-backward motion. 3-in. disk sander *B* can be used for any electric hand drill or drill press. Saw and file attachment *C* can be inserted into any electric hand drill and most drill presses. One average hack-saw blade will make 3 to 6 blades for this tool. Broken pieces of hack-saw blades can be used. Screwdriver attachment D can be used for electric hand drills and many drill presses. Unit has screw finder which keeps screwdriver in desired position on screwhead. The attachment will permit socket bits and Phillips screwdriver bits to be handled.



REVERSE-FLOW recirculating furnace, designed for close temperature control and uniform heating, employs a damper arrangement at fan outlet which reverses the direction of flow of gases through work at regular intervals. Furnace may be used for heat treatment of high-stress parts, including valve springs, connecting rods and cam shafts. Timer can be adjusted to give the reversing cycle wanted. Made by Sunbeam Stewart Corp., 4433 W. Ogden Ave., Chicago 23, Ill.

Hannifin's Small Arbor Presses Eliminate Manual Valve Operation

Two air-operated arbor presses, models M-1 and M-2 feature push-button-controlled electric valves which eliminate manual valve operation. Presses are marketed by Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.

Model M-1 is equipped with a 4½-in. dia. air cylinder with a 4-in. stroke and develops to 1270 lb. ram pressure with 80 lb. air-line pressure. Model M-2 has a 6½-in. dia. air cylinder and a 6-in. stroke and is capable of delivering ram pressures to 2650 lb. Stroke can be varied in both presses. Machines are applicable to common press-fit assembling operations and for light stamping, marking and die-cutting operations.

This...

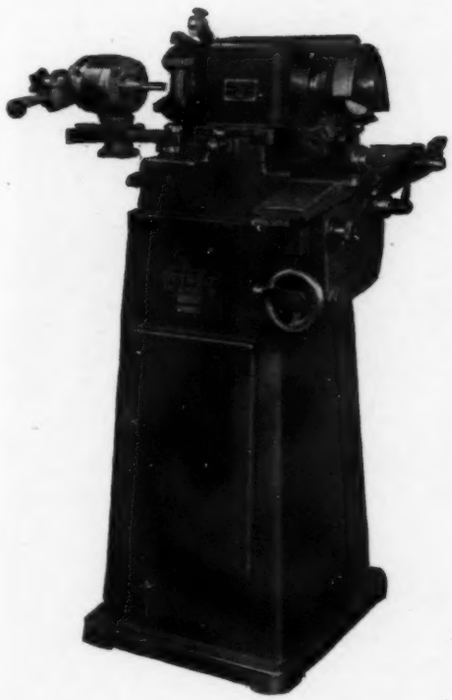
is the business end-

TAKE CARE OF IT

ON A

DETROIT

TAP RECONDITIONER



You can put worn taps right back in "good as new" shape with the DETROIT 4 in 1 tap reconditioner. It's like getting an almost unlimited supply of NEW TAPS for next to nothing, for this reconditioner is remarkably low in price—pays for itself in short order. It chamfers, grinds flutes (from 2 to 6), spiral points taps where required and polishes the points. Handles taps up to 1½ inch diameter.

For complete information write or wire for Bulletin #DTR-4.

DETROIT

TAP & TOOL CO.

8432 BUTLER AVE. • DETROIT 11, MICHIGAN

The Home of "M-11" CHROME-COBALT HSS TAPS, THREAD MILLING CUTTERS & THREAD GAGES

Parts and Materials

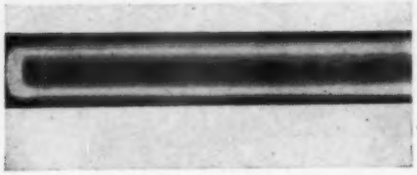
GE Amplidyne Control Unit Regulates Speed, Current

An amplidyne control unit, for use on steel mill and similar mill and processing line-control applications where speed, current, or voltage regulation are required, has been introduced by Controls Div., General Electric Co., Schenectady 5, N. Y. Unit provides motor speed-limit control, field forcing during acceleration and deceleration, and stabilizing functions. Small rheostats are used in place of conventional resistor units. Adjustments on the amplidyne control are facilitated by a swinging base.

Unit is 18x12x11 in., and contains adjusting rheostats, capacitors, rectifiers, and other instruments required for the regulating circuit.

Vitroseal Refractory Coating Forms a Protective Surface

An insulative coating for preventing spalling action, resisting heat penetration and decreasing carbon, slag and clinker adherence in fire boxes, furnaces and crucibles is offered by Whitman Co., 1407 Esperanza St., Los Angeles 23, Calif. Called Vitroseal, the coating forms a semi-glazed protective monolithic wall of from 8.5 to 9 hardness (Diamond is 10-Mohs scale) between fire and fire brick. It is said to be impervious to heat to 3390 F., and to speed heat-up time due to reflection. Coating is applied by either brush or spray. Available in powder form, water is added before application. One pound is said to cover 7 to 8 sq. ft.



Thermocouple Protecting Tube Is Cast with Both Ends Open

A heavy-wall, cast-iron, thermocouple protecting tube used for molten aluminum, zinc and die-casting metals, is marketed by Claud S. Gordon Co., Chicago, Ill. Called Servrite, the tubes are cast with both ends open. A special technique is employed for weld-closing one end. It is said that X-ray inspection (illustrated) reveals uniform wall thickness and freedom from casting defects.

Tubes are furnished with 3/8-in. wall thickness and 15/16-in. inside diameter.

GE Tungsten-Copper-Nickel Alloy Available in Non-Porous Sheets

An alloy of tungsten, copper, and nickel called Hevimet is introduced by General Electric Co., Chemical Dept., Pittsfield, Mass. The alloy possesses a density 50% greater than lead, giving it qualities applicable to the design and construction of moving parts possessing maximum inertia and minimum size.

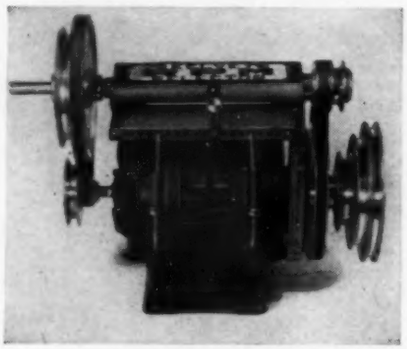
Hevimet can be used for balance weights which are said to eliminate vibrations in crankshafts, modern air screws, and other rotating parts. It can be plated with cadmium, chromium and nickel, and also silver soldered and brazed by standard methods.

The alloy is sintered material and is made in a variety of non-porous sheets and blocks. Complex shapes are possible by combining simple pressing with a special process of hydrogen welding. The average product is said to have a density from 16.8 to 17 grams per cc., a tensile strength of 85,000 to 118,000 lb. per sq. in., and a Rockwell hardness of 30 to 40 "C" scale.

Acraclad Finish by Acryvin Applied by Spray, Brush, Dip

A finish to be used on ferrous and non-ferrous metals is offered by Acryvin Corp. of America, Astoria, L. I. Called Acraclad, it is a one-step finish eliminating chemical and mechanical surface pre-treatments. Pre-cleaning and de-greasing are the only necessities. Quick baking cycle requires a maximum of 10 min. at temperatures ranging from 250 to 350 F. Certain alloys require a baking cycle of a maximum of 20 min. at the same temperatures.

Coating is non-toxic and is said to have a high corrosion resistance to acids, oils, alkalies and salt spray. It is applied by spray, brush, dip, or roller coat, and is said to cover from 350 to 450 sq. ft. per gal.

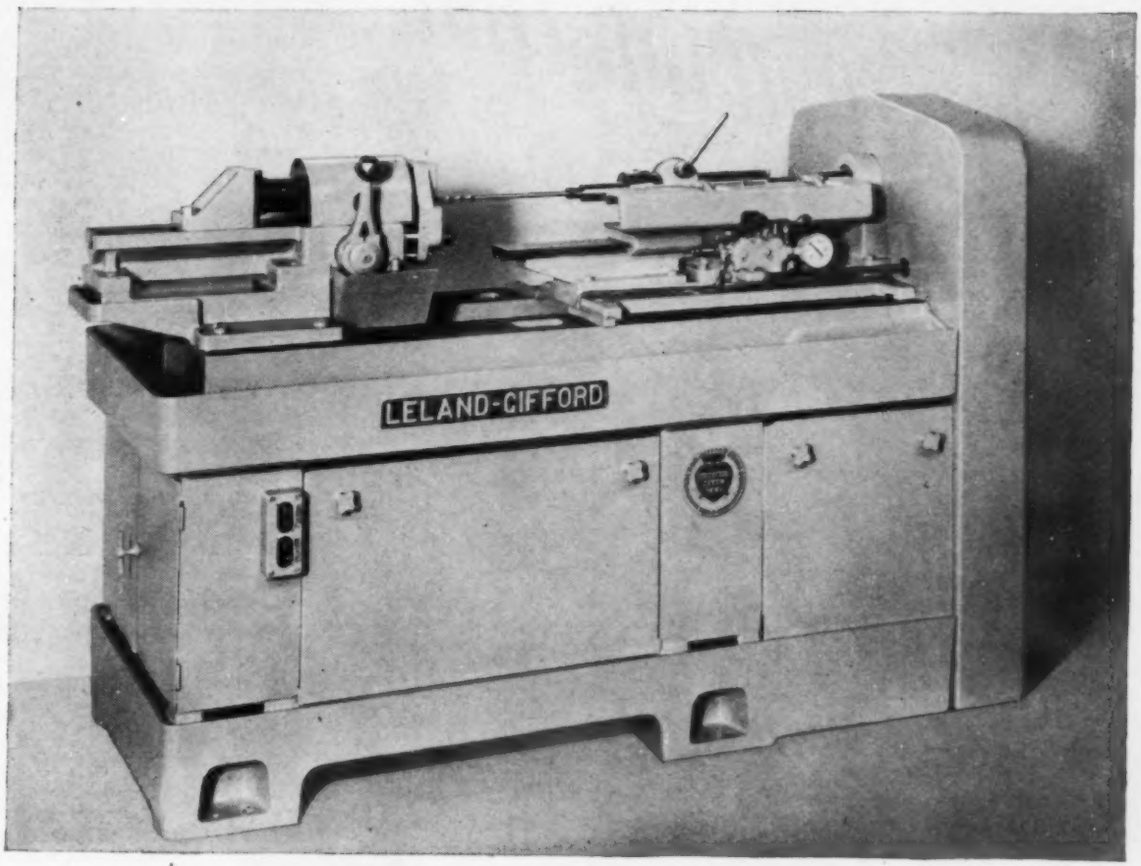


Sunset McKelvey rpm. Selector Permits Wide Range of Speeds

Sunset Equipment Co., 1813 West 11th St., Los Angeles 6, Calif., announces McKelvey's rpm. selector, a unit that attaches to and becomes part of an electric motor and permits complete selection of speeds leaving the motor. It can be used with electric motors on drill presses, lathes bandsaws and power tools. Speeds range from 66 to 10,000 rpm.

NOW!!!

A HORIZONTAL STEP X STEP DEEP HOLE DRILLING MACHINE which allows many kinds of work to be more easily loaded than on a vertical machine. Especially handy for Drilling Deep Holes in Shafts and Rods.



Single or Twin Spindles.
Several Lengths of Beds.

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

Your
ASSEMBLY SAVINGS
also
CUT SERVICING TIME

THE HOURS YOU SAVE in factory assembly by simply *peeling* precision laminations for accurate fitting of machine parts will be repeated by your users on every service adjustment. Want performance data and photo chart of applications?

Laminum shims are cut to your specifications, but shim materials for repair are sold through your industrial distributors.

Laminated Shim Company, Incorporated
87 Union Street • Glenbrook, Conn.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2218

ROUND TABLE Discussion

PIECEWORK IN THE TOOLROOM

Output incentives have long been used with success in toolrooms, and acceptable output, as well as earnings, have been increased thereby. In principle, there is no difference in using incentives for tool work and that of ordinary production.

In practice, toolroom work is generally of a one-piece or jobbing character, as against production work, where quantities usually predominate. Both are alike, however, insofar as definitely prescribed operations are involved. Each complete operation can be analyzed into its appropriate details, the time value of which can be estimated. The difference between estimates for tool work and production work is one of time, more being required for work of a precision character, such as toolwork, than for that of a less important nature. In a like manner, more time can be allowed as required to deal with the harder material used. To that extent there is no greater difference between toolroom work and production work of a high-precision character and between the latter and work of a lower standard of precision.

The basic factor with all incentives is tested, analytical data upon which job rates should be based. As would be expected, these data would be higher for tool work than for work of a less-precise nature. It should be remembered that not all tool work is of a high-precision character. This is especially true of the earlier operations. It is argued by some that incentives on tool work lead to scamped work. This is the same bogey used in the early days of incentives. Satisfactory inspection—necessary whether incentives are used or not—will always detect bad work.

J. E. Powell
Glos., England

•

TROUBLE SHOOTER OR TROUBLE MAKER?

A trouble shooter is a thoroughly trained man who is equal to any type of emergency, especially in his particular line of work.

A troublemaker is entirely different. He is, in most cases, a grouch who quarrels with other men who work with him, with his work, and

Is your cut-off time too high?

try a WELLS NO. 8 with wet cutting system

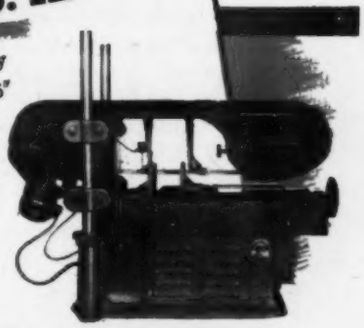
WHATEVER the job—rounds, squares, tubing or odd shapes—the Wells No. 8 Metal Cutting Band Saw will hold your cut-off time to a minimum. For production or general utility this saw has the speed, accuracy and versatility to pay for itself. The wet cutting system is an economical extra that makes possible higher cutting speeds and lower operating costs. See your Wells Saw dealer or write for full details.

Specifications

CAPACITY: Rounds	8" dia.
Rectangular	8" x 16"
With special Guides	5" x 24"
SPEEDS, Selective	60, 90, 130 ft. per min.
MOTOR:	½ H.P.
WEIGHT, Approximate	750 lbs.

for HEAVY DUTY jobs the WELLS NO. 12

The Wells No. 12 is a rugged, heavy duty saw with a capacity of 12" x 16" rectangular and 12¾" O.D. rounds. It features an automatic cutting cycle and controlled blade pressure.



Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

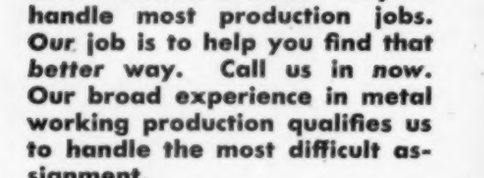
WELLS MANUFACTURING CORPORATION

505 ROOSEVELT RD., THREE RIVERS, MICH.

YESTERDAY'S MACHINES

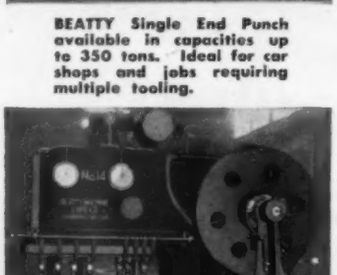
TOMORROW'S PROBLEMS

You can *win* or *lose* your battle of *sales on price! Obsolete* machinery means *high* production costs. But modern, *tailor-made* BEATTY-ENGINEERED machines can give you faster, higher-quality production at a *lower* cost. And you'll need that cost advantage in tomorrow's market. There's a better way to handle most production jobs. *Our* job is to help you find that *better* way. Call us in *now*. Our broad experience in metal working production qualifies us to handle the most difficult assignment.

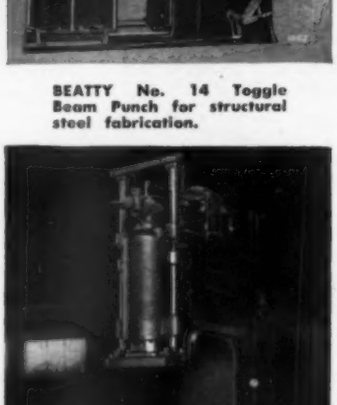


BEATTY Hydraulic Press Brake for V-bending, forming, pressing, flanging.

BEATTY Single End Punch available in capacities up to 350 tons. Ideal for car shops and jobs requiring multiple tooling.



BEATTY No. 14 Toggle Beam Punch for structural steel fabrication.



BEATTY 250-ton Gap Type Press for forming bending, flanging, pressing.

HYDRAULIC SHEET METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

even finds fault with the weather.

Troublemakers are not always working at the bench. Many of them are foremen or operators of machines.

A foreman should be on friendly terms with his men, but should not be familiar in a personal way with those who work under his direction.

When learning the machinists' trade, my foreman knew how to do every operation in his department and could operate every machine tool which was located there. This knowledge enabled him to direct and dictate the procedure for his men, but he would listen to reasonable propositions for improved methods.

He required good mechanics to be furnished to his department and then observed their talent for the various places where he wanted to put them.

True, apprentices occasionally made mistakes, but he corrected them so that the same error was not made twice by the same youngster.

He would ask questions as to how a workman contemplated doing a new operation, and they would "talk it over." He seldom fired a man, and, to a man, they liked the way he treated them. He was a master of diplomacy and could rely upon his men to do a good day's work.

Now, I believe this man was one of the best trouble shooters ever to come my way. He kept trouble from brewing among his men; he could repair or direct the men in the case of a breakdown; he could keep his department running smoothly; he made profits for the firm.

F. H. Stebbins
Worcester, N. Y.

•

STUDY IT OR DO IT?

I hope Ed learns to respect education gained in the classroom before he sentences his boy to a career like his own, based on shop training and study at home a few nights a week.

If a boy is to be a machinist, he will follow a highly useful trade, for civilization depends largely on his labors; but with shop training only, his future success may be limited. This is not belittling, for some machinists who never learned to read or write have undisputed skill as workmen. At the same time, we know that Carnegie, Westinghouse, Ford and many of today's leaders were not college-developed men.

The boy to be a machinist should go into a shop where a certain number of hours will be spent in the classroom. He will learn shop math, drawing, and kindred subjects, and,

HERE'S YOUR

Headquarters for Carbides

Staples OFFERS

A COMPLETE LINE OF CARBOLOY CEMENTED CARBIDES - TIPPED TOOLS

ROLLER TURNER
TURNING
BORING
FACING TOOLS
MILLING CUTTERS
REAMERS
CORE DRILLS
SPOT FACERS
END MILLS
SHELL END MILLS
FORM TOOLS
COUNTERBORES
CENTERS
MASONRY DRILLS

The name STAPLES has for many years been symbolic of *undeviating high quality* in the manufacture of Carboloy Cemented Carbide circular cutting tools. Now, to meet the increased demand for Staples quality, our facilities have been expanded to include Carboloy Cemented Carbide turning, boring, facing, roller turner tools—milling cutters—form tools—centers—masonry drills.

This new, complete line of *standard* Staples Tools is now available for immediate delivery. For all special tools, submit your requirements to Staples Design and Engineering Service. Write today for new catalog and complete information.

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write for your complete Staples Tool catalog

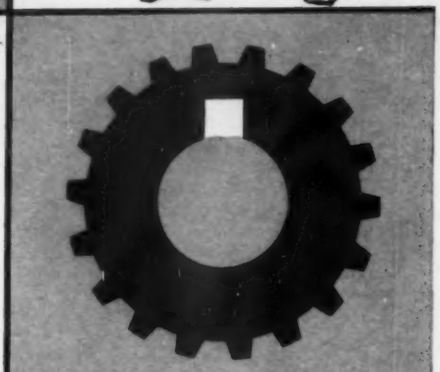
Staples CARBOLOY CEMENTED CARBIDE TOOLS
A COMPLETE LINE OF SINGLE AND MULTIPLE POINT CUTTING TOOLS
EXPANSION REAMERS • FORM TOOLS • CENTERS • MASONRY DRILLS • SPECIAL TOOLS

TIME IS MONEY...

BIG

MONEY TODAY

How long does it take you to cut a keyway like this?



With This Minute Man Keyway Broach Kit you can cut any keyway by hand in one minute in Gears, Pulley Hubs, Couplings, Collars, Milling Cutters, etc.

Pays For Itself In No Time. Cut a few keyways and this Set of Fine Tools and a handy, sturdy duMont Arbor Press (if you haven't one already) owes you nothing at all.

Ask Your Mill Supply Distributor to show you the complete range of *Minute Man* Kits so you can select the one that meets your shop needs most economically.

Mail This Coupon. Get the whole story on what this Kit does, how it works, how little it costs.

The du MONT CORPORATION, Greenfield, Massachusetts
Please send me Descriptive Folder and Price List "A"

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The du MONT CORPORATION
GREENFIELD, MASSACHUSETTS

above all, he should be taught to speak and write his thoughts in a manner understandable to others. A foreman who is unable to write a clear report to his superior is a poor person to trust with the duty of giving orders to men.

If the boy is to be a mechanic, plenty of "book learning" must be added to his shop training. If a boy is to be an engineer, send him to college and have him spend his vacations in the shop. After college some men work as special apprentices. In general, however, it is not necessary that an engineer spend years in a shop developing skill in the use of tools.

Where circumstances permit, send the boy to college, adding a liberal general training in such subjects as pattern making, foundry, forge- and heat-treating practice and machine and erecting or assembling practices. He need not be a skilled workman at any trade, but will be fortunate to have the fundamentals.

F. M. A'Hearn
Greenville, Pa.

•

The best way to acquire skill and proficiency is through trade training at a vocational school. Vocational education holds that the first phase, skill, is best acquired by following closely the laws of habit formation, while the second phase, information, is best acquired by a direct statement of fact in connection with its application in a real problem. The third phase, solving problems of the trade, is a prelude to actual and real shop work.

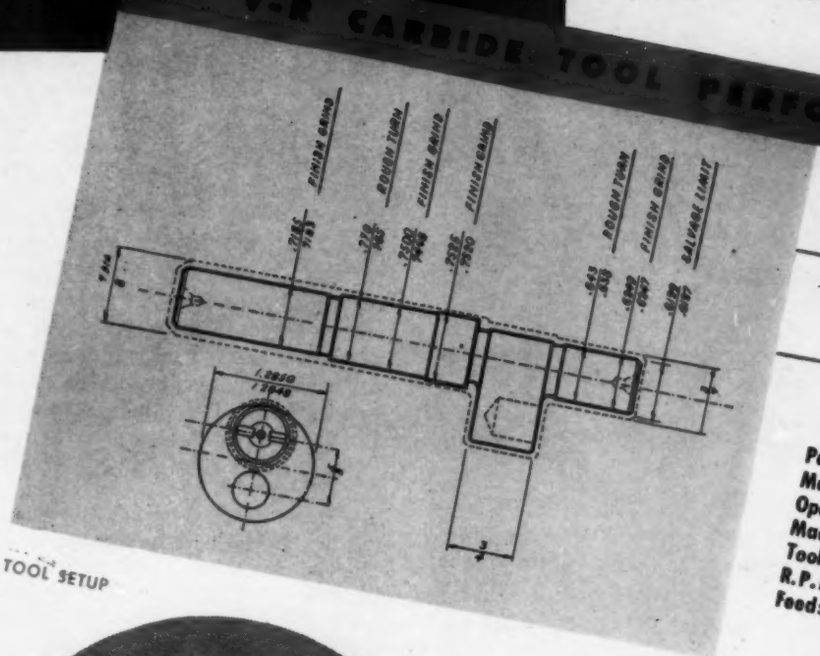
The practical application of these things on a real job is the only way to develop the resourcefulness, self-reliance and the planning ability which distinguishes the real mechanic from the student or unskilled worker.

An analysis of different methods of learning a trade indicates that the "pick-up" method of direct shop training is unorganized and haphazard; production is the sole aim and instruction an unconscious by-product. The apprenticeship method of having the student work with a master workman has production as its chief aim with instruction an unconscious byproduct.

The vocational school represents the best method for developing the most valuable skilled worker. It requires the student to handle any kind of practical job, within the range of his ability, and at the same time to get the utmost of educational value from it. It reveals to the student his own capacities and offers

for more pieces per grind its... V-R* CARBIDES

V-R CARBIDE TOOL PERFORMANCE REPORT

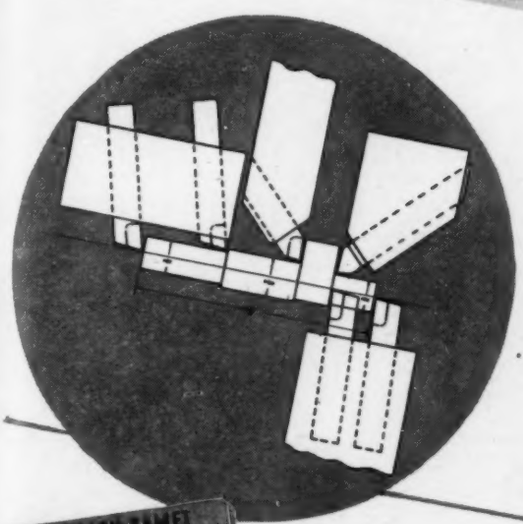


TOOL SETUP

Job No. OC675	Dept. Production
Reference File:	Crankshaft, Machining.

SETUP DATA

Part:	Crankshaft for compressor unit
Material:	Pearlitic Malleable Iron (163-207 Brinell)
Operation:	Complete machining of crankshaft
Machine:	New Britain Gridley Model 86 Double Index
Tools:	5/8" square V-R carbide grade EM
R.P.M.:	778
Feed:	.010



DETAIL DATA:

Pieces per grind (V-R Carbide) 650
Pieces per grind (Other Carbides) 435

There are 14 tools per set up on three machines and three different sized crankshafts run on three machines. The Genesee Hollow Mills for this same job are tipped with V-R carbide grade EM. On the basis of comparative tests, no other carbides came within 25% of V-R CARBIDES AVERAGE PERFORMANCE.

Ask your nearest Vascoloy-Ramet Field Engineer or write to the main plant for additional information on V-R carbide field performances. A V-R Field Engineer will gladly help solve your carbide problems without any obligation on your part. REMEMBER when you specify V-R you specify the world's finest carbide and field engineering service.

* Reg. U. S. Pat. Off.

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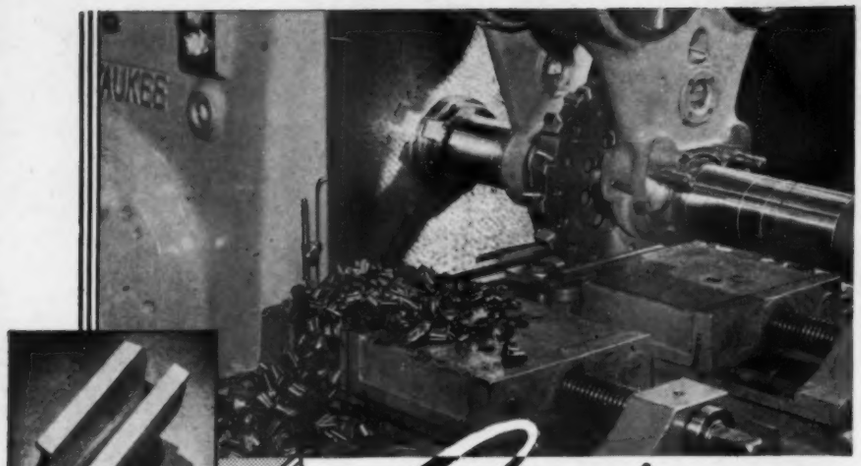
VASCOLOY-RAMET CORPORATION

NORTH CHICAGO ILLINOIS, U. S. A.

District Sales and Service in Principal Cities

AN AFFILIATE OF FANSTEEL METALLURGICAL CORPORATION AND VANADIUM ALLOYS STEEL COMPANY



Compare

THESE RESULTS WITH YOUR BEST!

A Lovejoy Type "F" Slotting Cutter with Tungsten Carbide-tipped blades used for milling slots in forged steel connecting links produced the amazing results that follow:

Workpiece: Connecting link used in mining machinery (see insert)

Material: SAE 3145 Forging

Hardness: 190–200 BHN

Operation: Mill slot 1 15/16" wide x 2 1/4" deep*
*Milled in one pass from solid metal section

Cutter: Lovejoy Type "F", T.C.T. Slotting Cutter 10" diameter

Speed: 117 r.p.m. (306 SFM)

Feed: 7.75 r.p.m. (.0065" per tooth)

Rate of Metal Removal: 21.8 cu. in. per minute

Finish: Excellent (no further finishing operations required)

A full description of this outstanding production tool is contained in the new Lovejoy Catalog No. 28. *Write for it today.*

"TOOL BITS"

Lovejoy has prepared a data sheet covering all blades for Lovejoy Type "L", "A" and "H" face mills. It has, in convenient form, all necessary information for reordering these blades. Also there are all the data on rake, bevel and working angles, both radial and axial needed for proper resharpening of the blades. In addition, the data sheet graphically illustrates the economies afforded by standard Lovejoy blades because they are interchangeable in a wide size range of Lovejoy cutters. The sheet is yours for the asking — send for it today.

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

an excellent method of development in him of the habit of carefully analyzing and planning any piece of work before beginning to do it. The vocational school preserves all the advantages of both individual and class instruction and provides for individual progress.

The essential purpose of the vocational school is definitely and specifically to combine formal education and shop training. It provides the necessary stepping stones of both formal and industrial education for the development of the skilled, resourceful and competent mechanic.

Harry Kaufman
Phila., Pa.

•

Study and practice are both needed for the best results. An actual experience of a friend after his entrance in a machine shop, will give my views best. This young man had a desire for mechanical work, but due to circumstances beyond his control was obliged to work for some time in other lines to make his living.

He made the acquaintance of a man who thought he could get him started in a shop. With this encouragement he purchased a book—*The Complete Practical Machinist*, by Joshua Rose—and found time to study it and learned thereby most of the standard practices of that day, which was just before the beginning of the 20th century.

A few weeks later he secured a job in a railroad locomotive repair shop as a helper with the understanding that if he made good that he would be given better work. After a few weeks service as a helper he was given occasional work at drilling, tapping, polishing, and later was given a lot of about 20 forked knuckle forgings and shown an engine lathe on which he was to do the lathe work. He was given a sample to work from and placed in charge of the man on the next lathe to coach him as might be necessary. The forgings were to be chucked on the forked end after being centered on the opposite end, which was to be threaded 4½ threads per inch.

The first one was centered, chucked, turned to size, and threaded, and was about to be removed from the chuck when the man who was coaching him noticed his work and exclaimed, "What did you thread it for? We always thread them on another lathe. The lathe that you are using will not cut the thread needed. You have spoiled that one and you should look at the change gear plate for thread cutting." How-

"FASTER four ways" says The Rudolph Wurlitzer Co.

Extracts from another of the series of independent surveys by James O. Peck Co., of assembly savings made with Phillips in leading plants.

"We specify Phillips Screws for our coin-operated phonographs," said Wurlitzer's engineering staff, "because they're faster four important ways.

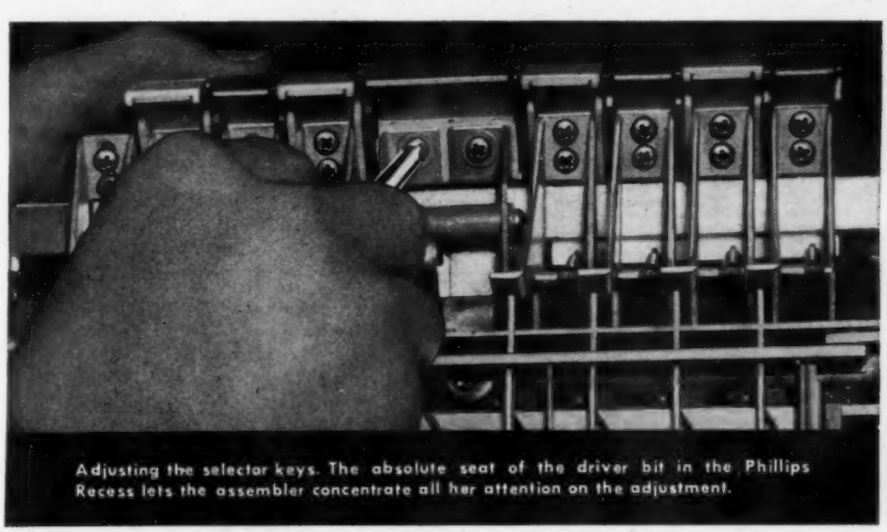
"Start quicker, drive faster. Although we haven't made actual time studies, it's fairly easy to see how much shorter assembly time is with Phillips Screws. That's natural . . . the perfect fit of the driving bit in the Phillips Recess makes locating the screw and driving it much more positive.

"Tricky assemblies simplified. The firm seat of the driver in the Phillips Recess speeds up otherwise slow jobs such as blind driving, sensitive adjustments, spring assemblies, and driving with jigs.

One screw driver slip at this point in the assembly and an expensive, highly polished piece of Plexiglas would be ruined; and worse still, a half hour of assembly time irretrievably lost. Wurlitzer uses Phillips Screws and avoids slips.

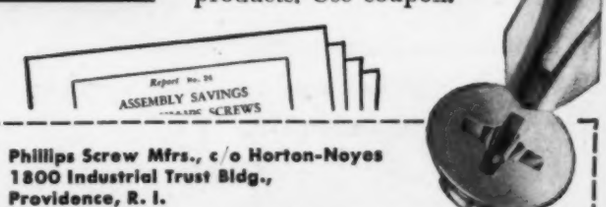
"No mental hazards . . . steadier work. Inside and out, there are a lot of places where a skidding screw driver would do a vast amount of harm to these machines. Since that danger is non-existent with Phillips Screws, our assemblers make better time, work more smoothly.

"New help learns faster. Even people who have never driven screws in factory production can be trained to drive Phillips Screws much easier and faster than they could be taught to drive slotted screws. Also eliminated is the danger to hands and arms from jagged, burred heads turned up so frequently on slotted screws. And far fewer screws are dropped on the floor . . . a not inconsiderable saving to us."



Adjusting the selector keys. The absolute seat of the driver bit in the Phillips Recess lets the assembler concentrate all her attention on the adjustment.

Ideas for your assembly operations . . . FREE, in this Wurlitzer report and in other assembly reports . . . covering metal, wood and plastic products. Use coupon.



PHILLIPS Recessed Head SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

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24 SOURCES

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Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wolverine Bolt Company

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Providence, R. I.

Send me reports on Assembly Savings with Phillips Screws.

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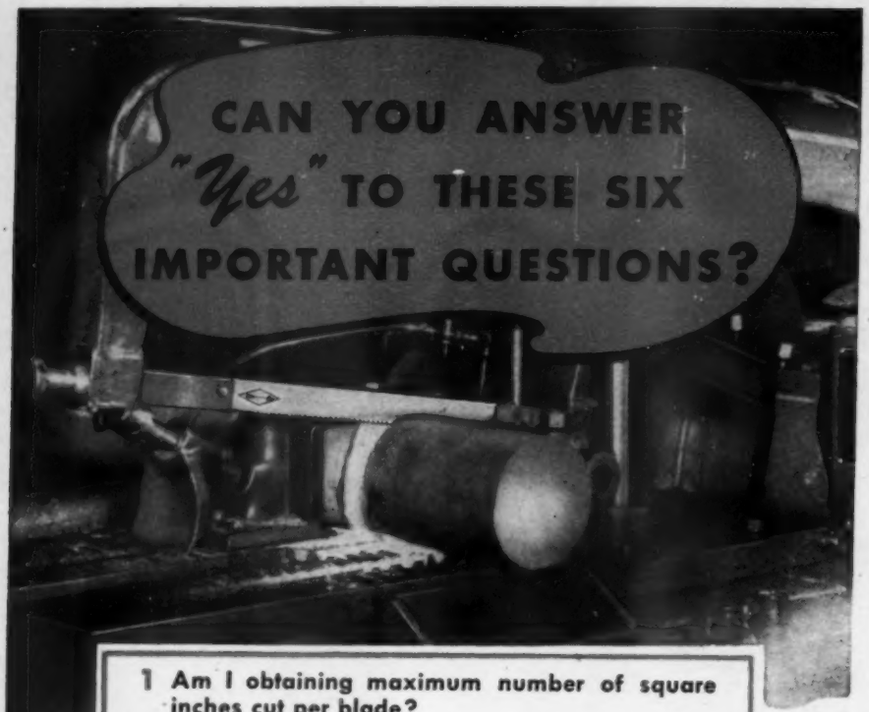
Company.....

Address..... AM-25



1 Am I obtaining maximum number of square inches cut per blade?
2 Am I using correct feed and speed to balance production against tool cost?
3 Do I use correct length and pitch of blade for size and type of material being cut?
4 Am I nesting materials in the most efficient manner?
5 Am I cutting my material in the shortest possible time consistent with normal blade life?
6 AM I USING THE RIGHT BLADE?

IF you can answer "yes" to all six, then you can be sure your production hack saws are operating most efficiently. The Barnes Hack Saw Production Calculator (free on request) has information that will enable you to answer "yes" to *some* of these questions; Barnes Service Engineers can give you the correct answers to *all of them!*

Why not let us match our top quality hack saw blade plus our knowledge of metal sawing against your cutting problems. Then you are assured your production power hack saws will deliver maximum cutting efficiency.

Your Barnes Distributor will have a Barnes Service Engineer call on you whenever you say—no obligation.

ESTABLISHED 1919
W. O. BARNES CO., INC.
DETROIT 14, MICHIGAN

ever the thread was cut correctly, as the operator had learned from the book how to figure gearing for thread-cutting. Proper gears were with the lathe but not listed on the plate.

The foreman happened along at this point and was given the same scare, but checked up the job, and finding it correct, complimented the young man for finishing the lathe work at one chucking, for being the first to find a way on that machine, which was used because it was a sturdy tool and removed the large amount of stock quickly, whereas the lathe used for threading was much lighter.

None of the lathes in that shop were provided with change-gear boxes or taper attachments, and when the foreman found out that the young man was able to figure the amount of offset the tailstock should have for taper work and the angle that the compound rest required for taper boring, he commenced giving the young fellow many such jobs to do, as well as figuring pulley diameters for speed changes and like jobs that had previously been done by men of much longer experience, all of which quite naturally led to quicker advancement for the young man.

Abel Blakeman
Watervliet, N. Y.

•

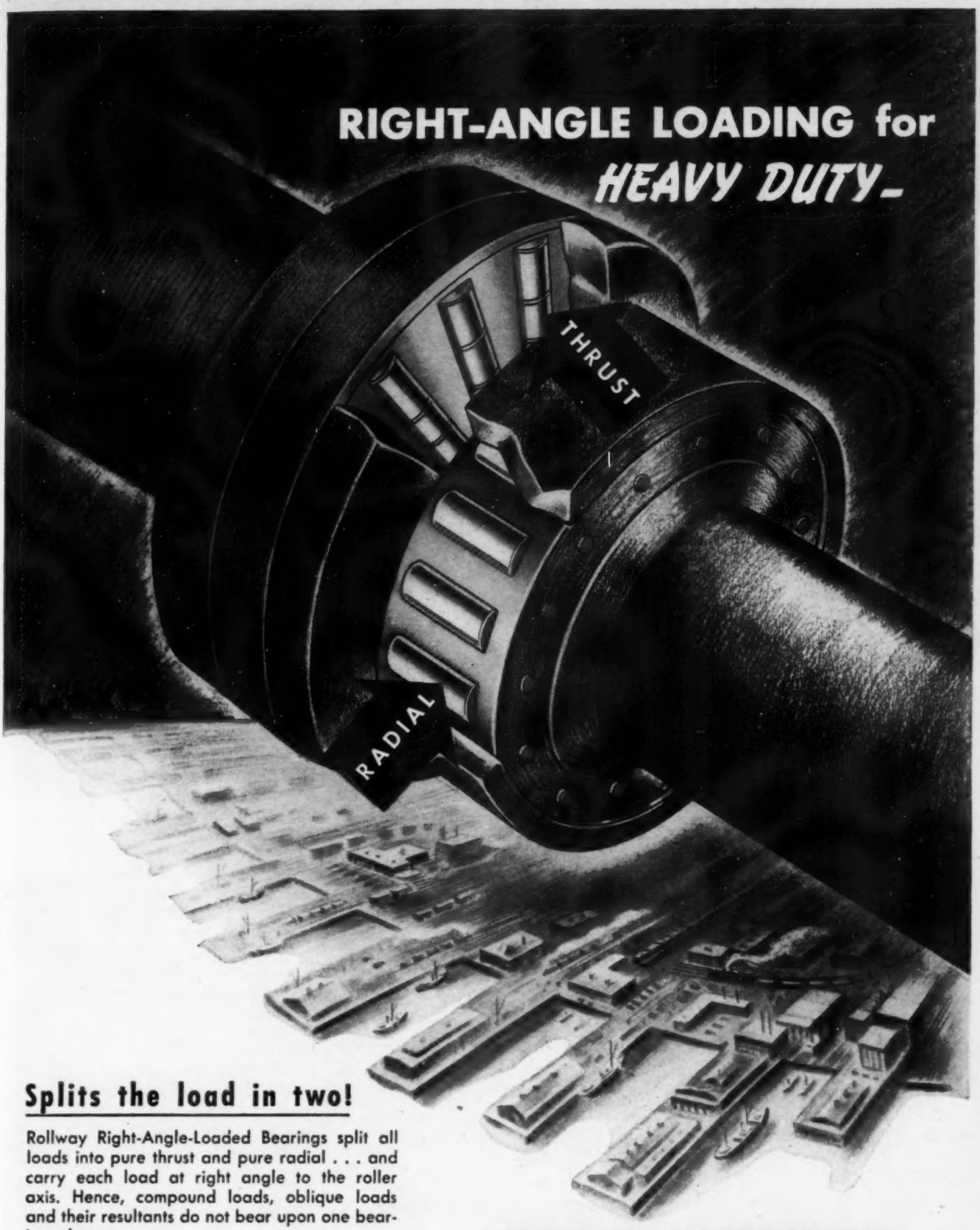
Shop experience is necessary to form, at least in part, the background for a good mechanical engineer. This practice is followed even by M.I.T. and other institutions of learning.

Ed wants the student to be working in the shop all the time. Student —but of what? This is the old way of training a machinist apprentice.

Modern modes are different. Vocational training schools, for example, start the young apprentice off with concentrated study, or "book-learning." The end of the course in machinist work follows with a period of time on shop work, after which graduation follows. Manufacturers, in their training plans, show they realize theoretical work is important and usually send "part-time extension" students, as they are called, for a day's study from books every week.

On the other hand, engineers, who work with their brains, cannot get along with only theory and book-learning, just as the machinist must have more than shop work in learning his trade. During this war, an aircraft engine manufacturing plant was employing college-graduate en-

RIGHT-ANGLE LOADING for *HEAVY DUTY-*



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Rollway Right-Angle-Loaded Bearings split all loads into pure thrust and pure radial . . . and carry each load at right angle to the roller axis. Hence, compound loads, oblique loads and their resultants do not bear upon one bearing alone.

This prevents wedging of rollers and pinch-out. Reduces roller end-rub, wear-back and rubbing friction. Cuts risk of shut-downs . . . cuts cost of maintenance and replacements.

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SYRACUSE, N. Y.

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BEARINGS

OFFICES IN: PHILADELPHIA • BOSTON • PITTSBURGH • CLEVELAND
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Pick the right chuck for the Job...

☐ INDEPENDENT CHUCK LONG TAPER "L" TYPE

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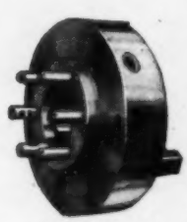
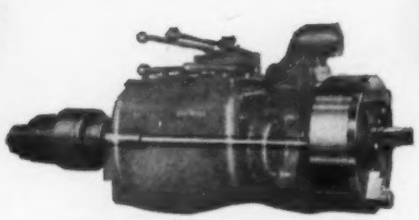
UNION CHUCKS



☐ TAPER SEAT CHUCK A1

☐ CAM LOCK CHUCK

☐ DRILL CHUCK



☐ TWO JAW CHUCK

☐ POWER OPERATED CHUCK

WHETHER your chucking needs call for a "jack of all trades" such as a combination chuck . . . or for a specialist like an indexing chuck . . . there's a Union chuck to do the job with rugged accuracy and cost-cutting efficiency.

Union chucks compose the broadest line of chucks in the world. Union maintains a complete engineering service to help you determine the right chucks . . . from drill to power chucks . . . for your particular purposes. Distributors in all important industrial centers.

The Union Manufacturing Company has been serving industry for 70 years. In chuck design and manufacture, Union has continually kept ahead of industry's needs, opening the way to greater productivity of men and machines. This engineering leadership, as well as Union's widely recognized integrity of workmanship, are reflected in the complete line of chucks described and illustrated in Catalog No. 62. Write for a copy today.

Chucks - Hoists - Trolleys

UNION MANUFACTURING CO.

296 Church Street

New Britain, Connecticut

gineers and putting them through an engineering-training course as a part of this work. This meant some time spent in each production department to learn practical aspects and problems of the factory. Al describes this training plan in his arguments. It seems to me he is more correct, being the advocate of a modern progressive plan.

One can't say whether shop or formal training is superior, as this depends on what the finished trained man is going to do for his living. If an engineer, more theoretical knowledge; if a toolmaker, more practical learning.

Edward Diskavich
Torrington, Conn.

•

The engineering college should be responsible for educating the young man, but not for training him. Training the engineering graduate is the job of industry. Inasmuch as industry takes most of the product of the engineering colleges, industry should be willing to assume its share of the responsibility for turning out engineers.

It follows that industry should be consulted by the colleges as to the best way to approach the complex problem of formulating suitable curricula.

After a boy has completed high school, if he can and will enter a shop for a period of from one to two years, it will be greatly to his advantage. Then, if he continues his work at a technical college, he will be far ahead of those who have not had this experience.

The boy who has training and experience will be broadened to such an extent that he can both study a problem and do it. He can save time when a problem is put up to him because of his college math.

The boy who lacks this training is handicapped in many ways, one of which is that he may be directed by a foreman, who may be an excellent mechanic, but who lacks the ability to impart his knowledge to another, while an instructor in a college instructs his students in a concentrated way and they can learn much faster.

F. H. Stebbins
Worcester, N. Y.

•

It is not a question of study *or* do it, but a question of study it *and* do it.

I would like to see an honest mechanic who would not admit he is learning, even after decades of experience. It is the experienced man

Wheels of Progress

From the wheels of antiquity to the wheels of modern industry Bearing Bronze continues to have its part. In the bus and motor coach of today (and in the automobile of tomorrow) the Torque Converter is the ultimate means for transmitting power where variable torque is needed.

Bunting Bearing Bronze blade rings are a functional part of these converters—have been for more than ten years. So, whether they are the antique chariot wheels of a Pharaoh or the modern wheels of industry and progress, Bronze—Bearing Bronze—has played and continues to play its important part. Today it is Bunting Bearing Bronze. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.

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Die Cushions for every punch press application.

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OPEN BACK INCLINABLE

5 TON - 10 TON - 18 TON - 30 TON

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FOR

- **BLANKING**
- **DRAWING**
- **FORMING**
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Many new features have been incorporated in the new models of PRESS-RITE PRESSES. A new improved clutch, a new positive single stroke attachment, improved brake, plus extra large die space, and many others.

PRESS-RITE PRESSES have been tested and approved after many years of service in large and small manufacturing plants, tool and die shops, small instrument manufacturers, etc. Investigate. Get all of the facts and complete specifications.

See your local dealer or write to Department A-248.

Sales Service Machine Tool Co.
2363 UNIVERSITY AVE. ST. PAUL 4, MINNESOTA

who knows the value of knowledge, and it is the experienced man who is getting wise to himself and is listening to and looking at what others say and do.

The foreman in the toolroom with his 30 or 40 years experience is a very valuable man, but if he is asking for authority just because of his long experience, he kills one very important thing—the individuality of his followers. He is adjusting people to his experience pattern.

The pupil who comes from college into the shop has, most of the time, a superior air wrapped around him. He stopped learning when he left school, and his behavior makes people learning with their hands disgusted with learning with brains. One day there will be a new type of qualified worker in our shop—the mechanic with the trained brain. But the question is whether we will have them in 10 years or in 50. It would save a lot of time to teach to learn instead of to learn how to teach. We only can teach if we learn, and we learn only when we teach. We have to put ourselves in the service of the things to be done so we will understand how to put the things done in our service. That will bring the machines to life and machines in our life.

It is a big question—how are things done; how to get them done? And there must be an answer to that or the shortsighted responsible men will be "done" themselves.

Peter Wretzel
New York, N. Y.

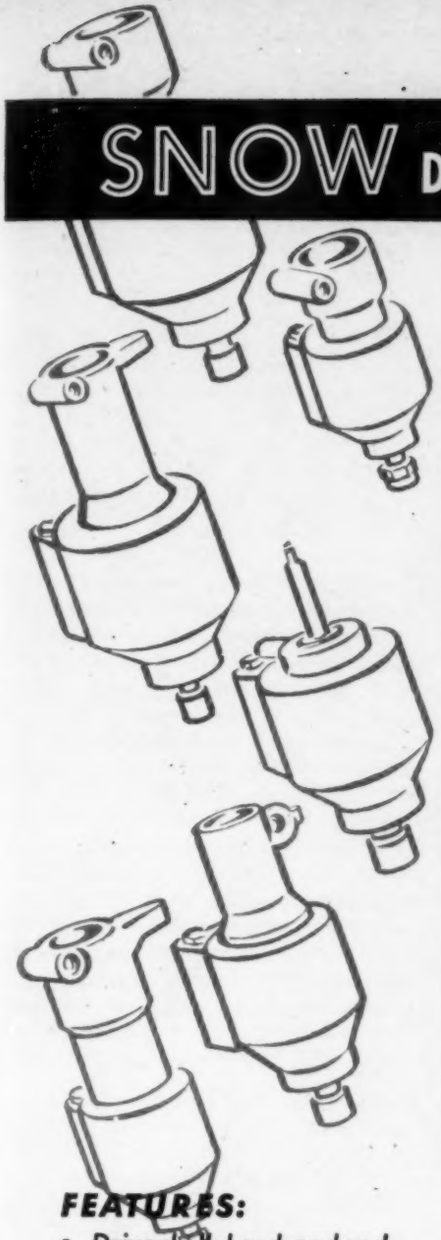
•

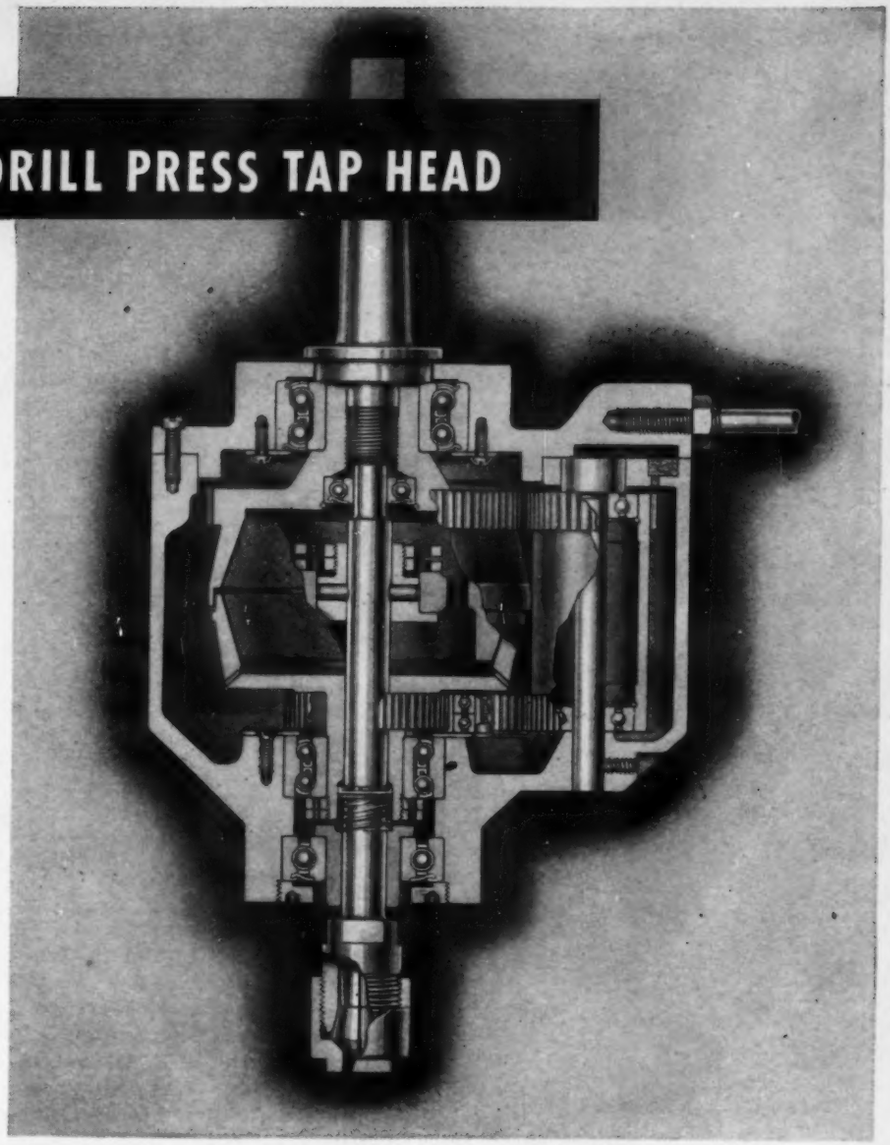
Ed is right in saying that many students who have either been forced or prefer to obtain their shop experience in short periods have gone on to get and hold some of the most important jobs in industry.

Ed is wrong in the statement condemning these boy students as being of no use. The fact is, they desire to get a little general knowledge of engineering shop practice to supplement their theoretical knowledge.

Ed wants to know how a man can get the feel of theory by studying books for several years and then working for 30 days. That cuts both ways. I know when I was a kid apprentice, I was not sufficiently educated to absorb and profit by what I found in technical journals, and envied those who were. Several college students were in the shop for a month or so. They were capable and eager to show us how to do problems in figures, so useful in machine-shop practice, and were

SNOW DRILL PRESS TAP HEAD





FEATURES:

- *Drive shells hardened and ground.*
- *Spindle in balance.*
- *Light weight clutch*
- *Spindle bushing revolves with bearing.*
- *No lateral float.*
- *Collets ground throughout.*
- *Eight ball bearings.*
- *2:1 reverse speed.*
- *Hardened alloy gears and studs.*
- *Delivery from stock.*

The SNOW Drill Press Tap Head is the same unit as used on the SNOW Full Universal Tapping Machines. It is the only Tap Head designed and manufactured for a machine tool by a machine tool builder.

Engineers and mechanics will recognize the rigid, sturdy construction; and operators will vouch for length of service, ease of operation, and quality of work produced.

Eighteen years of production testing, and thousands of installations have proven the advantages of using a precision built drill press tap head.

These units are avilable in three sizes—0 through ¼"; No. 6 through ⅜"; and No. 10 through ½"—both Morse taper and quill clamp styles are in stock.

SNOW MANUFACTURING COMPANY

437 EASTERN AVE., BELLWOOD, ILL. • SUBURB OF CHICAGO

Its versatility saves costly preparation time — provides precision grooving of single or multiple grooves at a production rate—plus economy of set-up time — and low initial cost.

The LYON has been designed for making internal grooves to tolerances of .001" using any drill press, turret lathe, radial drill or automatic equipment.

By changing only bushings and cutters within the tool model range, you have at your command a wide variety of bore sizes and shapes. A simple adjustment regulates location and depth of groove. Work cannot be scratched or marred because the head of the tool does not turn when the cutter operates.

Our Engineering Department will welcome the opportunity of discussing any grooving problem without obligation.

LYON MACHINE CO.,
WORCESTER 3, MASS.

bright, absorbing more real knowledge of workshop practice in a month, due to their education and studying, than we did in three or four months.

Ed states he got his education studying at night after work, and states he knows more about the shop than these students ever will know even if they went to school all their lives. Ed is right, but the majority of the students who make the industry their career are not limiting their ambition to being a machine shop foreman. Today you don't have to have years of shop practice and training to get hold of a big job in the industry. What you must have is a college education, supplemented by a good general all-around knowledge of shop practice.

There are lots of men occupying top jobs in industry who have not had a total of six months of practical work in machine shops, but the vast majority were college students.

Arthur Silvester
Niantic, Conn.

NEW BOOKS

PROBLEMS IN ENGINEERING DRAWING, SERIES II—*By A. S. Levens, Associate Professor of Mechanical Engineering, University of California, and A. E. Edstrom, Instructor, San Francisco Junior College. Published by McGraw-Hill Book Co., Inc. New York, N. Y.*

Keyed to Thomas E. French's "Engineering Drawing," seventh edition, this workbook covers varied levels of complexity, stressing conventional practices, and recommendations of the American Standards Association. Summary problems follows each section.

1947 METAL FINISHING GUIDEBOOK—*436 pages. Published by* Metal Finishing, *11 West 42nd St., New York 18, N. Y. Price $1.50.*

Under the complete title "1947 Guidebook and Directory for the Metal Finishing Industries," the publication *Metal Finishing* has published a very useful compilation of reference articles on a number of finishing procedures, plus a directory for equipment, materials and supplies required for electroplating, organic coating and related finishing methods. Tradenames are also listed.

The technical sections of the guidebook are written by various authorities and cover these subjects: Abrasive methods, cleaning and pickling, electroplating solutions, surface treatments, control and testing, chemical tables, organic finishes, methods for organic finishing and testing.

•

PROBLEMS IN DRAFTING & DESIGN—*By Francis L. Goff, Chief Draftsman, Eureka-Williams Corp., Bloomington, Ill. Published by McKnight and McKnight, Bloomington, Ill. 117 pages-6½x10¼ in. Price $1.00. Flexible cover.*

Presentation of fifty problems with orthographic and pictorial drawings arranged in order of complexity includes problems in sheet metal, castings, forging, machine parts and layout, for the beginner.

Incorporating the fundamentals of general drafting, and stressing drafting and design of aircraft with emphasis on the latest industrial practices, practical information for the student is interwoven with instruction.

Problems are presented mainly in form of perspective drawings accompanied by assignment sheets. Specific references are included.

•

INDUSTRIAL ELECTRONICS MAINTENANCE—*By R. C. Rootger. Published by Prentice-Hall, Inc. New York, 190 pages. Price $3.50.*

As clearly stated at the outset, this is a trade-school text intended to familiarize electrical service men with the principles of modern electronic control devices, other than communications equipment. Industrial electronics maintenance is both preventive and corrective, and keeping factory machinery in good order with the minimum of breakdown requires a simple understanding of circuits, the actual components, their installation and hook-up in the machine they control, as well as practical knowledge of magnetic, electromechanical, pneumatic, hydraulic and optical control elements.

Circuit-testing equipment, the keeping of records and trouble-shooting are well emphasized and the only pre-supposition is that of a fundamental training in electricity. Typical circuits of modern applications of electronic control are given, together with their explanation so

the student should be well prepared to handle any specific piece of equipment with the aid of manufacturer's literature.

There is no more need for an electronic maintenance man to understand the plant electrician to know higher mathematics, than for an automobile mechanic or power plant engineer to know thermodynamics.

This book clearly identifies and explains the workings of industrial electronic equipment with a minimum of mathematical ways and wherefores, and emphasizes that in the long run, the cheapest maintenance is an ample supply of spare parts and frequent sensible replacements before failures actually occur.

•

AN INTRODUCTION TO METALLURGY (SECOND EDITION) — *By Prof. Joseph Newton, University of Idaho. Published by John Wiley & Sons, Inc. 440 Fourth Ave., New York 16, N. Y. 645 pages, 6 x 9 in. Price $5.50.*

This is an elementary treatment of the subject, stressing principles rather than practices, and intended for classroom instruction. Information has been added on pyrometallurgy, corrosion and powder metallurgy. The treatment is general rather than specific and heavily on the smelting and refining side, not on heat-treatment and heat-treated structures.

•

NON-FERROUS PRODUCTION METALLURGY (SECOND EDITION) — *By John L. Bray, head, School of Chemical & Metallurgical Engrg., Purdue University. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 587 pages, 6 x 9 in. Price $6.*

Primarily a college textbook, this volume is heavy on smelting and refining, light on heat-treatment. It is intended primarily for embryo metallurgists, but can be useful in showing reasons behind characteristics of non-ferrous materials.

•

INDUSTRIES ANSWERIGHT—*By Charles Z. Smith, Sr., President, Geraflash Co. Published by Geraflash Co., 105 Grove Ave., Albany 3, N. Y. 441 pages. Price $6.*

A great deal of reference material is included in this large, mimeographed book. It has outlines for determining dimensions for standard and special thread gages, detail drawings of interlocking and staggered tooth cutters, and many practical problems illustrated have been taken from the familiar industrial sources.

Eight-place tables of trigonometric functions, tables of dimensions for plug and ring thread gages, conversion tables between inches and millimeters and between decimal parts of a degree and minutes and seconds are included in the book.

Other sections include the solving of triangles, a slide-rule digit system, and compound-angle problems for flat and circular form tools. The book is intended to serve as an on-the-job reference and as a refresher for home study.

•

WORK AND EFFORT—*By Thomas Arthur Ryan, Associate Professor of Psychology, Cornell University. Published by The Ronald Press Co., New York, N. Y. 324 pages, 6x9 in. Price $4.50.*

A composite survey of psychological investigations covering industrial problems such as training and learning, control of accidents, establishment of pay levels, and design of efficiency methods, this book is written for the use of industrial managers, supervisors, personnel directors and psychologists.

Using the relationship and interdependence between these various problems as the central theme, the author includes studies on light, heat, ventilation, monotony and fatigue. Statistical significance is emphasized by enlightening illustrations and tables covering many phases of applied psychology related to production.

TO THE EDITOR

Dear Editor

In the Oct. 9 number of AMERICAN MACHINIST was a tabulation of exports to various countries. I noted particularly the large proportion of this equipment that is going to Russia.

Are we clean, plumb crazy? Do we have to repeat the whole Japanese scrap-iron program all over again? How can we possibly justify letting any valuable equipment go to a country that has announced its intention of wiping us—or at least our ideology—off the map?

Isn't there a way to bring this matter to a head—and a sane decision—before it is too late?

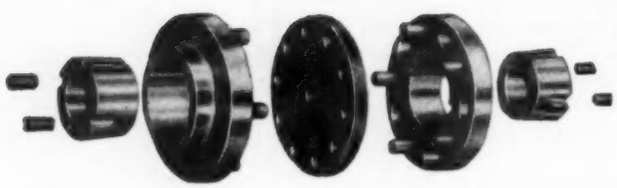
Name withheld

ThredKut *
INCREASED OUTPUT
4 to 1
. . . reports
JOHN L. MOROSINI
D. A. Stuart Oil Co.
Representative
"Prior to using THREDKUT,* this customer had tried several types of cutting oil in tapping 1½" dia. x 1" holes in very tough cast steel, with a maximum production of 50 tapped holes before sharpening was necessary. On switching to THREDKUT,* output immediately increased to 200 tapped holes between sharpenings. Here is another instance where THREDKUT* demonstrated its well-established reputation for licking a tough job."
John L. Morosini
ThredKut *
. . . Stuart's THREDKUT is a unique cutting oil carefully manufactured to insure the maximum benefits from controlled chemical activity. Its outstanding performance on really tough jobs has long been recognized and its flexibility proved through exceedingly widespread use. The many time-tested values built into THREDKUT are serving the leaders of the metalworking industry, increasing efficiency and reducing costs.
Ask to have a Stuart Service Engineer discuss your cutting fluid requirements. THREDKUT literature available on request.
STUART service goes with every barrel
WRITE FOR DETAILS
D.A. Stuart Oil Co.
2729 SOUTH TROY ST., CHICAGO 23, ILL.

NOW! TAPER-LOCK* FLEXIBLE COUPLING!

It's new! It's different! A packaged Flexible Coupling . . . available from stock . . . and ready to install *without reboring.* It's another Dodge development for mechanical power transmission that saves time, cuts cost!

* TRADE MARK REGISTERED U.S. PAT. OFF.



- ✔ Built with the famous TAPER-LOCK bushing (patented).
- ✔ Available from stock in a wide range of standard bores. *No reboring!*
- ✔ Fastens to shaft with the firmness of a shrunk-on fit.
- ✔ Easy on—easy off. Can be disconnected without moving coupled machines.
- ✔ Compact design occupies minimum space on shaft. Safe! No projecting parts.
- ✔ "Pin Type" design with oak tanned sole leather center disc provides flexibility, resiliency and strength.
- ✔ Made of close grained semi-steel and machined all over to insure balance and true running.

DODGE MANUFACTURING CORPORATION
MISHAWAKA, INDIANA

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

(or write the factory) for complete bulletin on this newest Dodge contribution to better mechanical transmission of power. The Transmissioneer—your local Dodge distributor—is a factory trained specialist. Look for his name under "Power Transmission Equipment" in your classified phone book.

Copyright, 1948, Dodge Mfg. Corp.

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

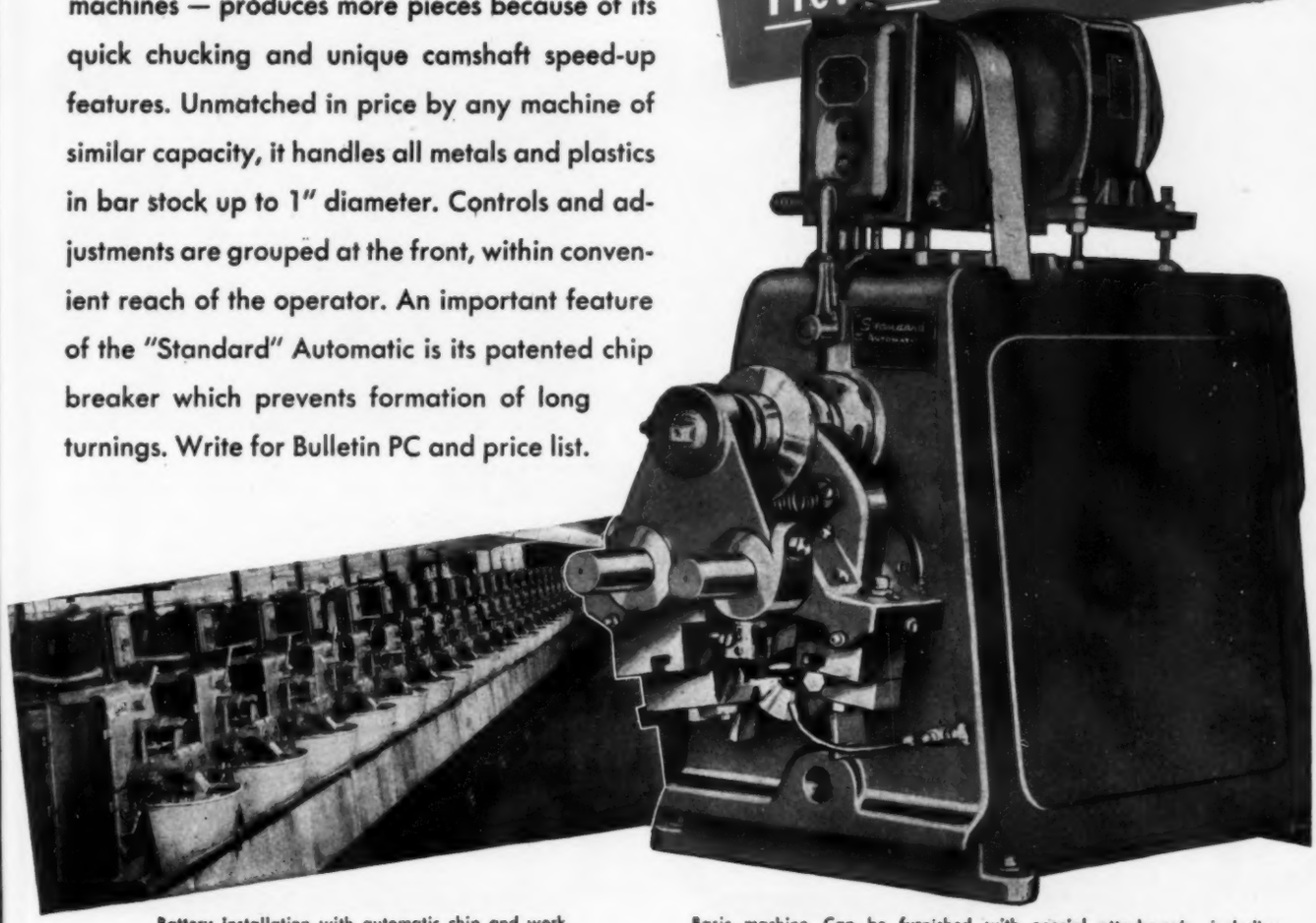
"Standard" AUTOMATIC

SCREW MACHINE No. 2

Pat. No. 2,373,155 April 10, 1945

The new "Standard" Automatic performs in shorter cycles than conventional screw machines — produces more pieces because of its quick chucking and unique camshaft speed-up features. Unmatched in price by any machine of similar capacity, it handles all metals and plastics in bar stock up to 1" diameter. Controls and adjustments are grouped at the front, within convenient reach of the operator. An important feature of the "Standard" Automatic is its patented chip breaker which prevents formation of long turnings. Write for Bulletin PC and price list.

HARMONIC CHIP BREAKER Prevents Long Turnings



Battery installation with automatic chip and work conveyor and central coolant system.

Basic machine. Can be furnished with special attachments, including drilling or boring tools, steady rest, etc.

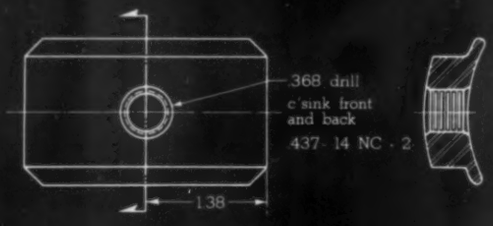
STANDARD MACHINERY COMPANY

1565 ELMWOOD AVE., PROVIDENCE 7, R. I.

EXPORT DEPARTMENT: 1111 SOUTH FERRY BLDG., NEW YORK 4, N. Y., U. S. A.

COMBINED OPERATIONS

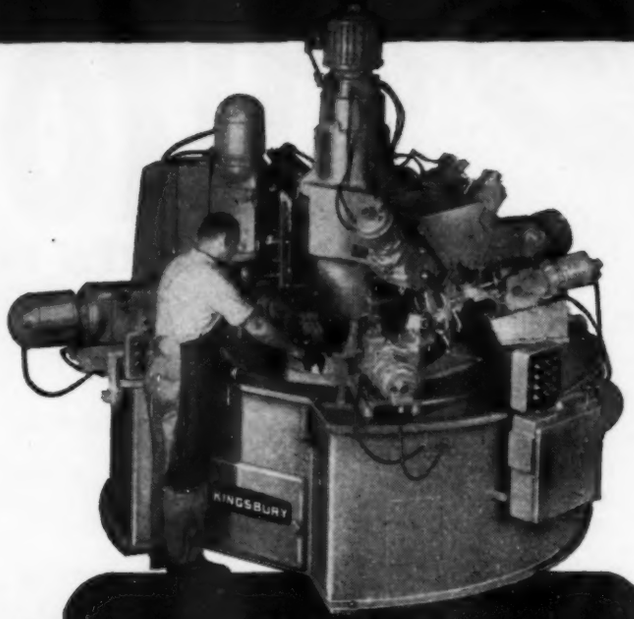
STEEL POLE PIECE FOR GENERATOR



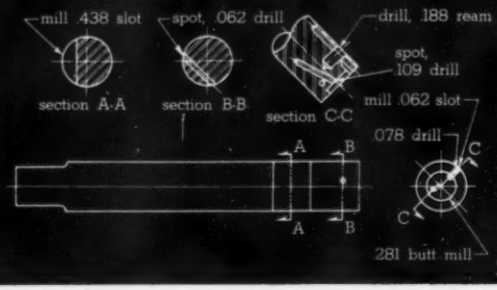
PROBLEM Drill, countersink front and back and tap with one operator. Clamp and unload all parts automatically.

METHOD Each fixture holds four parts. Four units each have four spindles, one per part. A special compact air cylinder with equalizers clamps the parts at one station while one unit drills and another countersinks from across the index table. The parts ride in nests on a ring that is cut away so that finished parts drop out.

Production rate: 1630 pieces per hour.



STEEL RIFLE BOLT



PROBLEM Spot, drill, ream, mill and butt mill from five directions in one chucking of the work.

METHOD A 40-inch automatic indexing machine performs all operations. A central column supports 5 units — 1 vertical for the .438 slot and 4 inverted at 45° for the .062 and .188 holes. A 100-inch base holds 6 units — 2 angular for the .109 hole and 4 horizontal for the other operations. Bushings guide every drill and reamer.

Production rate: 336 pieces per hour.

Kingsbury machines feature:

Automatic units Up to 5 hp. Individual speed and cam feed control for efficient operation. Operate at angles. Use multi-spindle auxiliary heads for operations of about equal size and depth.

Accurate location Spindles located to exact indicator readings. Plates for tool guide bushings pilot onto fixtures.

Reduce costs Increase output per man-hour. Reduce handling. Save space.

Uniform product Unvarying work cycle. All fixtures on index tables exactly identical and located to ±.0002.

Operations in exact relation No part disturbed in its fixture until completed.

Synchronizing Prevents the index table from moving until every tool is retracted.

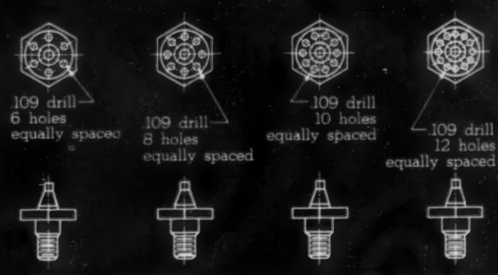
Completely tooled Ready for use.

Electrical installation Complies with Machine Tool Electrical Standards.

Rugged construction Will do accurate work for years at intense production. Wear parts of heat-treated alloy steel. Preloaded precision spindle bearings. Gears induction-heated and shaved. All castings normalized before machining.

for HIGH PRODUCTION

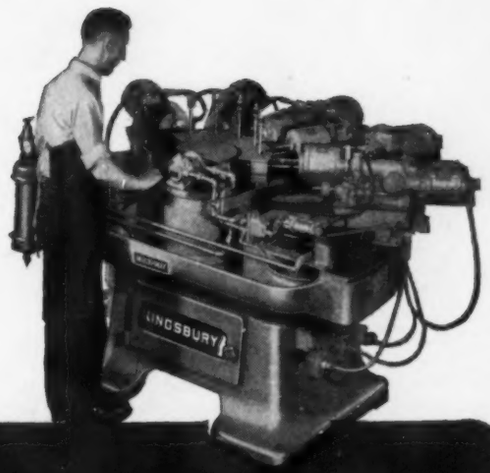
STAINLESS STEEL NOZZLES



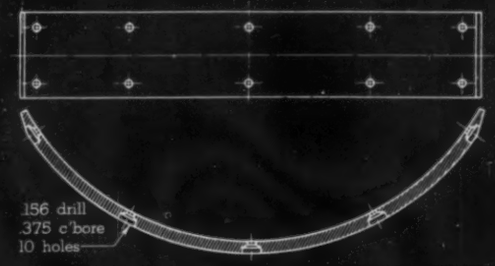
PROBLEM Drill parallel holes equally spaced at any of these angles, 30°, 36°, 45° or 60°. Make it easy to adjust spacing.

METHOD Four drilling units side by side operate independently using indexing fixtures with 3-jaw self-centering chucks. Each drilling unit indexes its fixture after each operation except the last one. The operator can make any fixture index any multiple of 3° up to 60° by adjusting the throw of pawls that rotate a ratchet gear.

Production rate: 95 pieces per hour average.



BRAKE LINING



PROBLEM Drill and counterbore using combination tools. Provide for relocation of tools and automatic ejection.

METHOD Every unit drills one pair of holes in the same part at once. The work is concentric with dovetails around a semi-circular base. The adapter support for each unit fits into these dovetails so that each unit can be moved but always points radially. An air cylinder operates two fingers that eject each finished part.

Production rate: 860 pieces per hour.

Seven basic machines for efficient application Four types are shown above. The other three types are: cross drill and countersink, vertical index and dial feed. We have used these seven types to tool up over 3400 machines.

If your high production problems are similar to some of these, we can probably show you economical solutions. Send prints showing operations and required hourly output to: Mr. L. A. Carll, Kingsbury Machine Tool Corp., 60 Laurel Street, Keene, N. H.

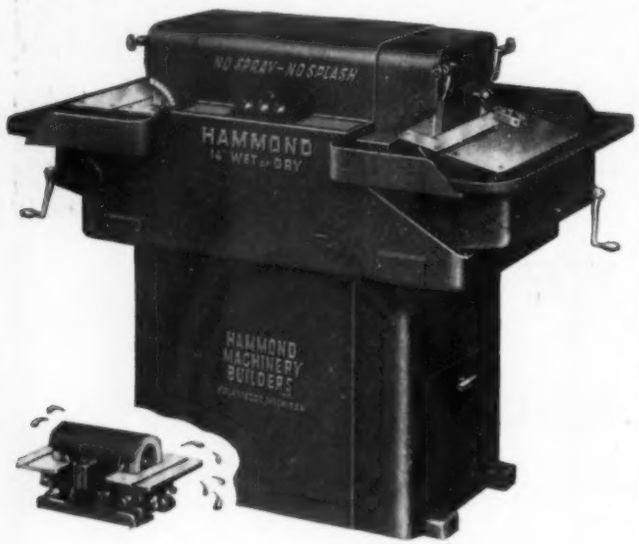
FREE BULLETINS SHOW 40 OTHER SETUPS.

KINGSBURY

DON'T ASK A BOY TO DO A MAN SIZED JOB!

You wouldn't put a 98-lb. boy on the line against "Two-Ton-Tubby" because "Tubby" has the power and drive to come smashing through.

Likewise, you can't ask a small carbide grinder to stand-up against quantities of large tools. It takes the "Two-Ton-Tubby" HAMMOND 14" CARBIDE TOOL GRINDER to come smashing thru with profits, because the HAMMOND 14" has what it takes, the power and drive to cut your tool sharpening costs.



The HAMMOND 14" is a man size grinder for production carbide tool grinding and large tools.

- 3 HP totally enclosed fan-cooled motor.
- Tables are 12" x 22" with removable steel wear plates over entire surface.
- Heavy Duty construction — net wt. 2300 lbs.

It will rapidly pay for itself through better and faster grinding. Write for Carbide Grinder Catalog 220.

Hammond Machinery Builders INC.

1618 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

THE WORK GLOVE WITH 7 LIVES

JOMACS OUTWEAR ORDINARY WORK GLOVES UP TO 7 TO 1 . . . SHOP RECORDS PROVE IT!

JOMAC work gloves not only *outwear* ordinary gloves—they *outperform* them, too. They can be washed or dry cleaned repeatedly, and used over and over again. They have unusual flexibility, which permits complete hand freedom and assures a quick, firm grip every time.

All these advantages stem from the remarkable JOMAC fabric. It's a tough, loop-finished cloth honeycombed with hundreds of air-cell "cushions" —each one held securely in place by a hidden lock-stitch.

For full details, write C. WALKER JONES Co., 6139 North Lambert St., Philadelphia 38, Pa. Plants in Philadelphia, Pa., Detroit, Mich., and Warsaw, Ind.

Foreign Representatives: Gillespie & Co. of New York, Inc., 96 Wall St., New York 5, N. Y.

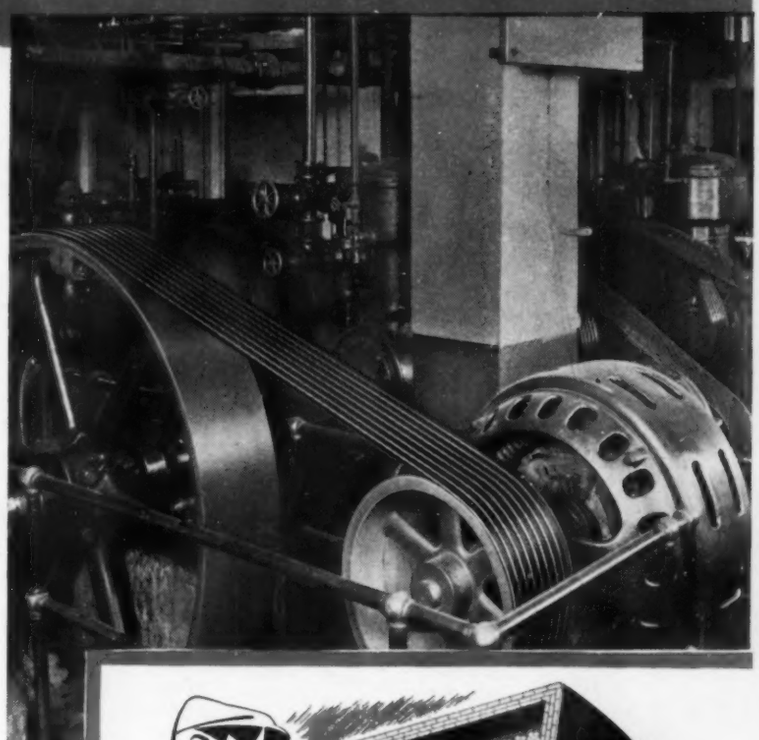
"SHAKE HANDS WITH SAFETY"

JOMAC INDUSTRIAL GLOVES

THREE TYPES OF JOMAC GLOVES

REGULAR INDUSTRIAL TYPE • HEAT- AND FLAME-RESISTING SAFETY GAUNTLET-CUFFS

WHY DAYTON V-BELTS *Save Space*

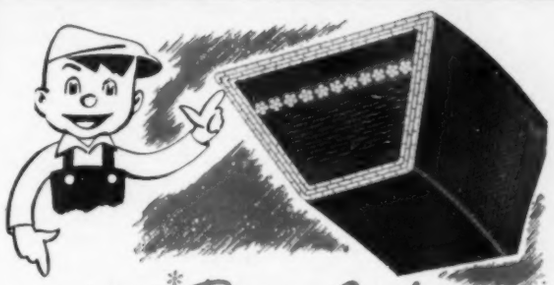


5 Compressors NOW... in Space Formerly Taken by 3

In 1935, the superintendent of a large ice cream manufacturer found it necessary to install two additional compressor units in an already overcrowded power plant. He did it by replacing the original drives on three existing compressors with Dayton V-Belts. Because of the much shorter distances required from the center of the motor pulleys to the center of the compressor pulleys, enough floor space was saved to enable the superintendent to install the additional two much-needed machines! *Further savings were made by using the large flat pulley of the original drive.*

Dayton V-Belts save space because they have tremendous gripping power . . . need to contact only one-third of the pulley for efficient operation. Because of the smaller contact area required, machine and motor can be placed closer together, providing extra space for more machinery, wider aisles or for office or storage space. Space saving is one of many reasons why Dayton V-Belts can help solve your power transmission drive problems efficiently and economically. Get the full story from your Dayton Distributor. Call him today.

THE DAYTON RUBBER COMPANY
Main Office and Factory: Dayton 1, Ohio
Branch Offices: Atlanta · Boston · Chicago · Cleveland Dallas · Detroit · Los Angeles · Minneapolis · New York Philadelphia · St. Louis



NOW! *Rayon Cords
PROVIDE DAYTON V-BELTS WITH
1. MINIMUM STRETCH
2. GREATER FLEX STRENGTH
3. LONGER V-BELT LIFE

*Rayon cords are specially processed by Dayton for use in V-Belts to provide the most efficient and economical power transmission service for your needs. For the complete story, write for booklet A-469.

V-BELT BUYERS! A leading mill supply house near you stocks Dayton V-Belts . . Look for the name in the yellow pages of your telephone directory

Dayton Rubber

THE MARK OF TECHNICAL EXCELLENCE IN NATURAL AND SYNTHETIC RUBBER

THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

IT TAKES SOMETHING EXTRA TO BE A *Specialist!*

Navigation demands specialized knowledge, mathematical precision and resolute responsibility . . . not so much different from the characteristics required to produce BATH taps!

Toughened by hardening and tempering—then ground from the solid, BATH ground thread taps are "controlled taps"! All grinding is done on center holes (ground after the blank is hardened), thus holding all dimensions concentric with the tap axis. This means closer tolerances in all stock and special size BATH taps.

The name BATH on any tap represents our responsibility . . . to consistently uphold a tradition for quality. See your BATH representative or write direct about your tap problems.

(Transportation is paid to your plant on all Bath products)

JOHN BATH CO.
INCORPORATED
22 Grafton St., Worcester, Mass.

GROUND THREAD TAPS
PLUG THREAD GAGES
INTERNAL MICROMETERS
RING THREAD GAGES

Producing More Wire at Less Cost

Extending Die Life with Oakite CrysCoat Process

BY treating ferrous rods and wire with a non-hygroscopic, ductile, crystalline coating, the Oakite CrysCoat Process adsorbs and retains die lubricants. In addition, the Oakite CrysCoat Process combines chemically with surfaces treated to provide *additional* lubrication.

Among the proved advantages resulting from the use of the Oakite CrysCoat Process are increased production through less frequent changing of dies; longer die life; uniformly excellent wire appearance; retardation of rust. Technical Bulletin gladly sent on letterhead request. Send TODAY to Oakite Products, Inc., 24 Thames St., New York 6, N. Y.

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SPECIALIZED CLEANING MATERIALS • METHODS • SERVICE
Technical Service Representatives in Principal Cities of U. S. & Canada

ALMOND DRILL CHUCKS

Maximum Gripping Power with Extreme Accuracy and Long Life

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Ashburnham, Mass., U. S. A.

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ⅜" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

Speed-wet* Discs Cut Faster...Longer

because they're 3 ways better

"30% Faster" . . . "production 4 to 1 better" . . . "lasts 5 times longer" . . . never before have so many people expressed so much praise for any disc we ever made.

Technically, the secret of the extra cutting speed and long life of Speed-Wet Discs lies in the balanced combination of three quality features: heat-set resin bonding for resistance to heat; all-fibre backing for extreme flexural strength; and all-Durabonded* coating for rugged grit anchorage.

An on-the-job test in your own plant will prove to you the increased production performance of Speed-Wet Discs. We'll be glad to arrange it at your convenience—just write us on your company letterhead.

* *Reg. U. S. Pat. Off.*

- ***All Resin Bonding***
- ***All Fibre Backing***
- ***All Durabonded Coating***

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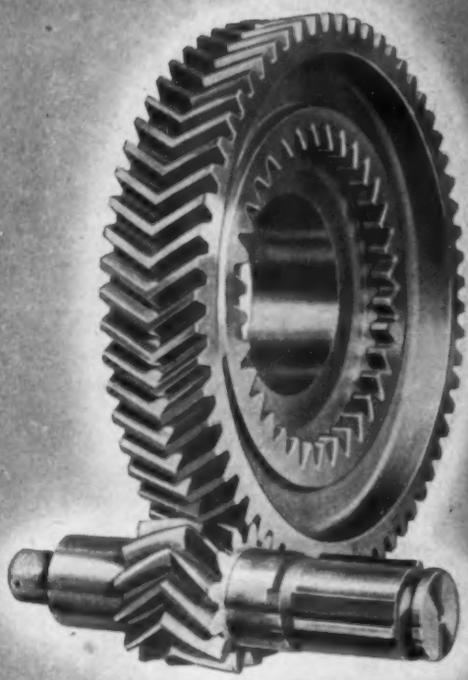
BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.

2 WAYS TO TELL A BETTER HERRINGBONE GEAR



1. IS IT PRECISION MADE? — The Farrel-Sykes method of generation gives Farrel gears extreme accuracy of tooth spacing, contour and helix angle. This tooth-to-tooth accuracy pays off in smooth, uniform power flow. Backlash is reduced to a minimum and the load is distributed evenly across the entire face width.

2. DOES IT HAVE A BACKBONE?—The *backbone,* formed where the two helices meet without a center groove, puts the entire face width to work and provides extra strength and higher load-carrying capacity in less space—a definite advantage in many applications. Farrel-Sykes gears are known as the *Gear with a Backbone.*

The precision generated *Gear with a Backbone,* made by Farrel, is available in any size up to 20 feet in diameter, for practically any application. Information and engineering assistance available, without obligation.

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Any size or shape to utmost accuracy. For quotation on price and delivery Write Dept. G 2

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...send your gear specs to SIER-BATH

ARE YOUR CUSTOMERS becoming more rigid in their demands for quality? Many manufacturers of mechanical products will find that they can improve their equipment with little or no additional cost by specifying better gears. The extra cost of the gears is offset by economies in design and assembly made possible by the better-fitting gears. Reduction of total accumulated error in gear manufacture permits the use of smaller gears, resulting in a more compact and less expensive machine.

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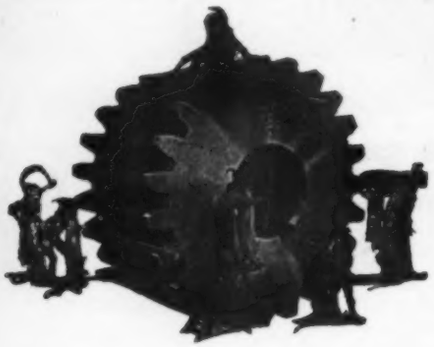

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Good Features
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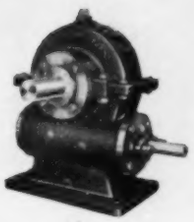
here are **"slowdowns"** that spell real **efficiency**



To cut high-speed power sources to fit slower running machines, nothing beats Grant Speed Reducers . . . engineered by gear specialists to fit your requirements . . . made in a wide variety of speeds . . . several combinations of gear styles and shaft arrangements.

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Radial thrust ball bearings
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GEARS SPURS, SPROCKETS SPIRALS, BEVELS

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ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY

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Smoother... Quieter OPERATION
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Cincinnati ZEROL* bevel gears are recommended to interchange with straight bevel gears in pairs where thrust limitations and other factors do not permit mounting provision for spiral bevels or hypoids.

An outstanding characteristic of Cincinnati ZEROL* bevel gears is the localized tooth contact. This permits a slight tolerance in positioning gears when assembling. For smoother . . . quieter operation with faster assemblies we suggest Cincinnati ZEROL*.

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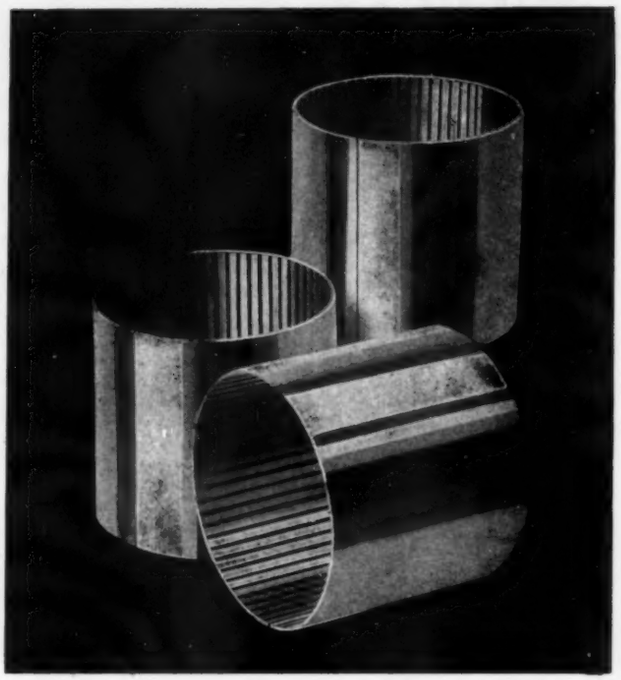
Thin wall bearings, which includes a thickness range of $\frac{1}{32}$" to $\frac{7}{64}$" are growing in popularity every day. And rightly so. Engineers and designers appreciate the many distinct advantages such as compactness, extra strength and resistance to pounding plus the comparatively low cost. Excellent delivery is now available on these three types...



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Available in two alloys . . . Johnson No. 40—copper 90; tin .5; zinc 9.5 and Johnson No. 44—copper 88; tin 4; zinc 4. Either of these two alloys will provide excellent bearing characteristics and are low in cost, particularly on long runs. Any type oil groove, slot or oil hole can be secured and the bearings can be graphited or ball indented for grease.

Steel and Babbitt

A distinct favorite with builders of internal combustion engines. The famous Johnson Slip-in Bearings are steel and babbitt, now used on so many popular makes of automobiles. The babbitt is permanently bonded to the steel thus assuring long life, smooth operation with a low coefficient of friction.

Pre-Cast Bearing Bronze on Steel

Write today for complete, technical data on all types of Sleeve Bearings. It's FREE!

A new and unusual bearing material that combines the excellent bearing characteristics of a high grade bronze alloy with the strength of steel. Its use permits you to increase speeds and loads . . . to gain longer bearing life with smooth operation . . . plus greater resistance to shock and wear.

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Call in your local Johnson Bronze representative. Permit him to show you how you can use Thin Wall Bearings to your advantage.

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MOST COMPLETE SLEEVE BEARING SERVICE

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OPERATOR CONTROL means gradual or instantaneous starting and stopping.

OPERATOR CONTROL MEANS ACCURACY because it permits smooth lowering and lifting as slowly or as rapidly as desired.

OPERATOR CONTROL MEANS SAFETY, because it helps prevent accidents that might otherwise occur in jerky lowering and hoisting, or in hand lifting.

OPERATOR CONTROL MEANS ECONOMY because it eliminates motion wasted in operating chain blocks, or lifting by hand.

In addition to Operator Control, Ingersoll-Rand Overhead Air Hoists offer other time and money saving advantages . . . increased efficiency and output . . . tested durability . . . reduced maintenance and operation costs . . . minimum operator fatigue.

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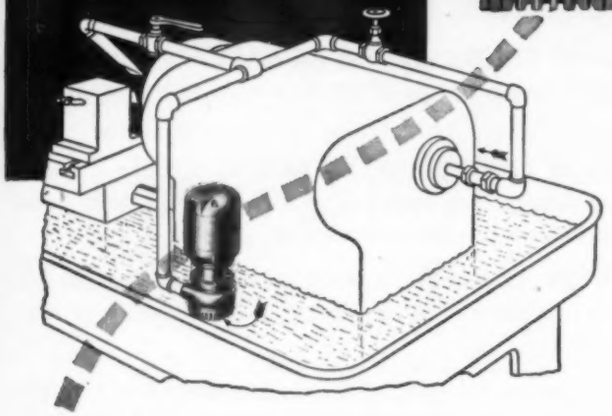

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Designed for Shallow Chip Pans Without Covers

Here is a performer with nine lives . . . it will give years of service . . . easily and quickly installed either with new equipment or as replacements . . . the inlet grille serves as a base, allowing the pump to rest directly on the bottom of the tank . . . clamps and holding brackets are not required.

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Pioneer Pumps in Seal-type, Seal-less and Rollway designs for pumping coolants, cutting fluids, abrasive liquids, lubricants and water available in every type and size. Please describe your installation when writing for information.

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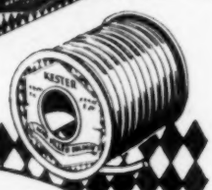
SOLDERING OPERATION

Cut labor costs and increase efficiency with KESTER CORED solders. Their dependability, uniformity and pureness will give you the utmost speed in every type of soldering operation.

Use Kester ACID-CORE solder for general work; KESTER ROSIN-CORE solder for all electrical work. Be sure with Kester.

It's Pure
It's Uniform
It's Kester



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FOR EXAMPLE

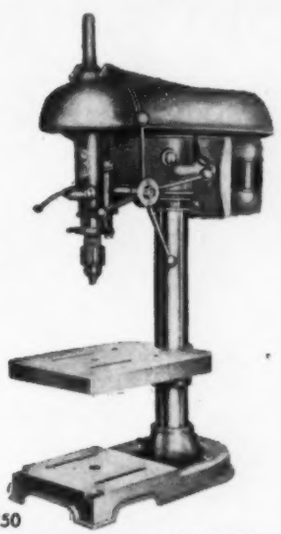
DONNELLY ELECTRIC & MFG. CO. SIMPLIFIES DRILLING OPERATIONS BY OVERHEAD MOUNTING OF WALKER-TURNER 15" DRILL HEADS

How to drill and tap holes in bulky radar cabinets, some five feet high, without lifting them onto a drill press table was the problem faced by the Donnelly Electric & Mfg. Co., of Boston, Mass.

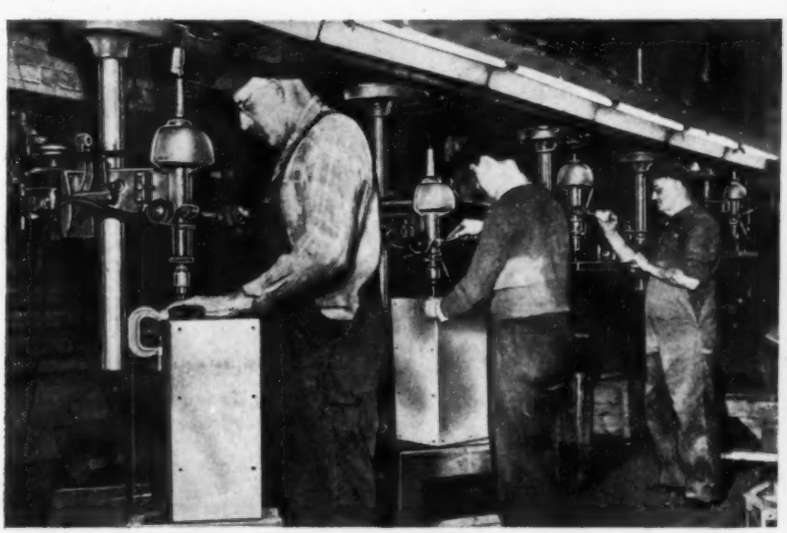
The adaptability of Walker-Turner Machine Tools made the solution simple. A battery of standard Walker-Turner 15" Drills was mounted from above and the cabinets, each requiring 44 holes of five different sizes, were placed on hand trucks and pushed along underneath them.

This is only one example where Walker-Turner Machine Tools are being used in groups and in special set-ups designed by the users to solve unusual problems, or free costlier machines for other work. Because they consider them excellent, rugged all-around machines, Donnelly also uses Walker-Turner Drill Presses for a wide variety of standard operations. Metals machined include cold rolled steel, hot rolled steel, aluminum, brass, and stainless steel.

Light-weight and compact, Walker-Turner Machine Tools offer extreme flexibility of mounting and control. Their wide range of speeds enables them to handle all types of materials from wood and plastics to tool steel. Rugged construction permits many operations, assures long, trouble-free life under the most rigorous production program. And low investment, low operating cost means real savings. *For complete catalog, write to Walker-Turner Company, Inc., Plainfield, New Jersey.*



Model D-950
Price: Less motor and belt guard $69.50*



Photo, lower right: 44 holes of varying size are drilled in metal radar cabinets with Walker-Turner 15" Bench Model Drill Presses. A cumbersome lifting job is eliminated by the overhead mounting.
**Photo, upper right:* 15" Drill Press, Bench Model D-950. 6 spline spindle, 4 ball bearings, 4¼" spindle travel, speeds with 1740 r.p.m. motor range from 600 to 5000 r.p.m. Capacity ½". Slo-speed motor optional.

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DRILL PRESSES—HAND AND POWER FEED
RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS
POLISHING LATHES
FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL
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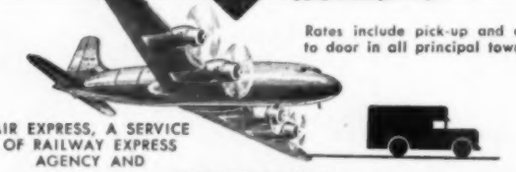
Rates include pick-up and delivery door to door in all principal towns and cities.



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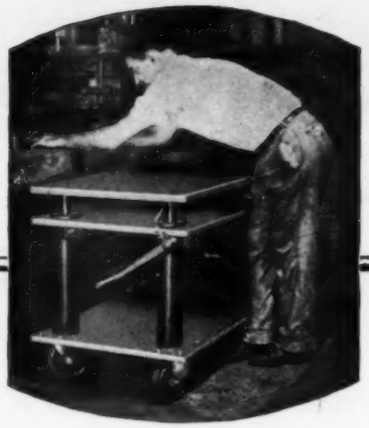

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SEND *one* MAN and PORTELVATOR

Stop idle machine time! With Portelvator, the Hamilton Portable Elevating Table, one man can safely lift and carry loads usually requiring the strength of four.

Three table surfaces. **Four point support.** Working area accessible from all sides. Slow lift for heavy loads. Fast lift for light loads. Floor lock for rigid positioning. A practical tool in any plant.

Be practical! Investigate! Write for Bulletin P-47.

THE *Hamilton* TOOL COMPANY

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Fundamental standards—length, mass and time—are determined by comparison with measurements set by statute. There are no such "standards" to measure hardness. But . . .

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Remember, the "ROCKWELL" Hardness Tester is made only by Wilson. And Wilson makes only hardness testers.

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GORTON

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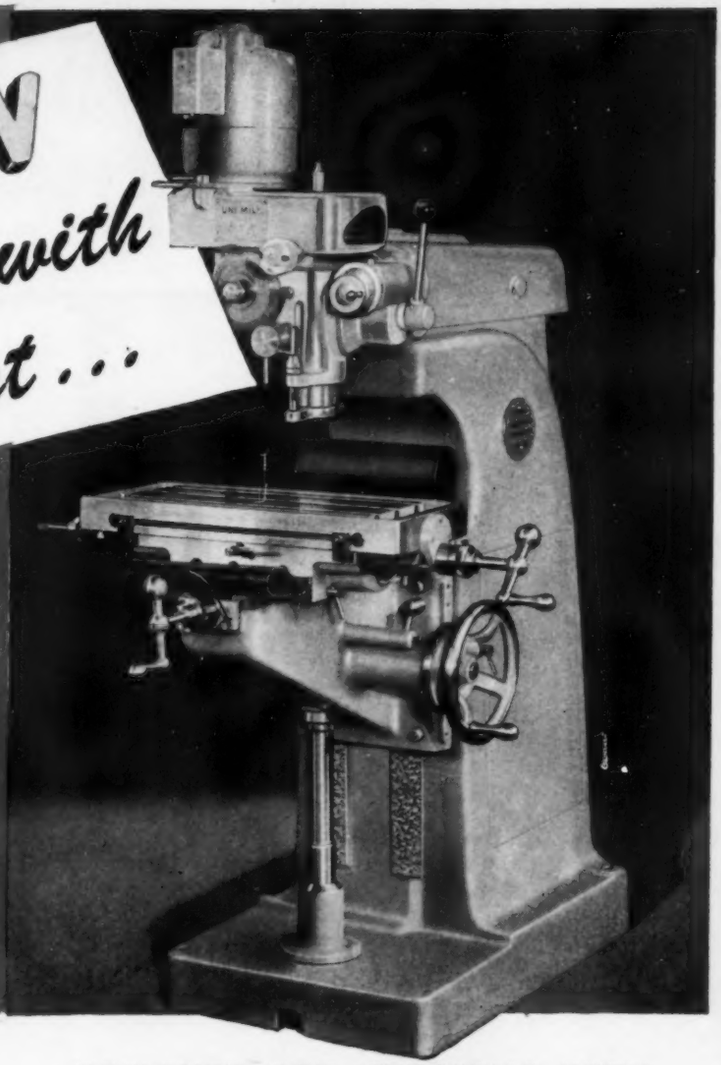

ANNOUNCING THE NEW 0-16A SUPER-SPEED MILLING MACHINE

(with Swivel or Universal Head)

Indispensable in the Tool Room and Machine Shop . . . Adaptable for General Engraving, Brass Routing, Die and Mold Duplicating

This new 0-16A *Gorton Super-Speed mill incorporates all of the features necessary in an "all purpose" machine. It will do a better job for you on any work within the limits of its size.

The Gorton 0-16A is *rugged*. It is designed for operator convenience and features extremely sensitive table and saddle controls. Spindle speeds from 300 to 10,000 R.P.M. available. ½ H.P. motor.

*Trade Mark Reg. U. S. Pat. Office

DESIGNED FOR VERSATILE DUTY— Check These Features

Heavy column, adjustable ram, super-speed spindle permanently lubricated, swivel or universal head, positive spindle brake, spindle lock, quill lock, depth stop graduated in thousandths, micrometer and lever feed on spindle.

Adaptable for . . .

. . . General engraving and brass routing by using special extension spindle and foot treadle attachments.

. . . Die and mold duplicating by adding tracer head and duplicator table.

Get complete information on the new Gorton Multi-Spacer indexing fixture with built-in automatic selector by writing for Catalog 1317.

FREE all the facts FREE

On the new 0-16A *Gorton Super-Speed Swivel Head, Universal Head Mill . . . use this coupon or write for Bulletin No. 1655-1501. No obligation, of course.

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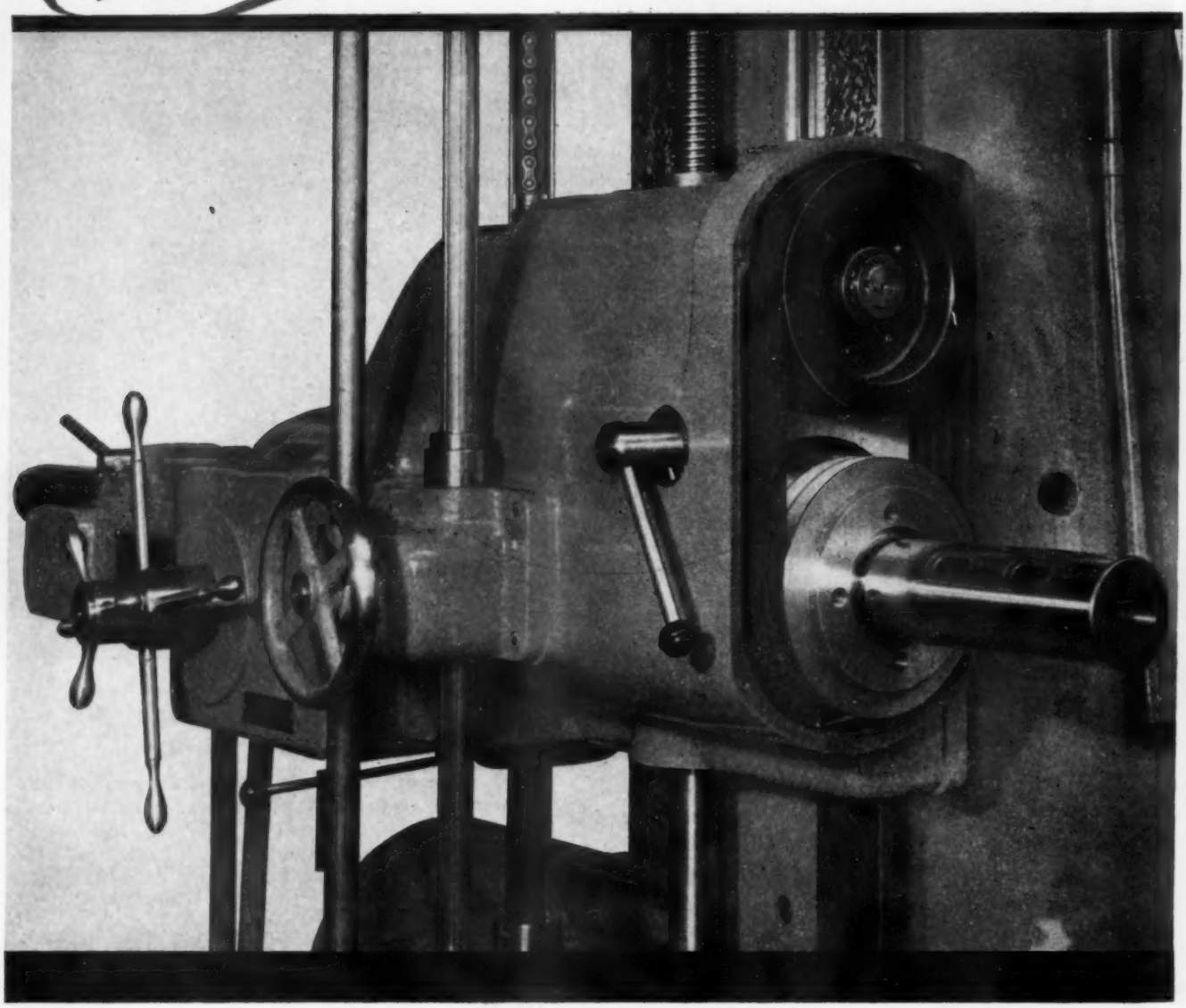
Tracer Controlled Milling

1501 RACINE STREET • RACINE, WISCONSIN, U. S. A.

Only the Lucas Horizontal . . has Multi Vee Belt Drive on High Speed, Carbide Milling and Drilling



Multi-Vee Belt drives are the positive answer to operators' demands for chatterless, vibration-free milling, boring and drilling at high speeds.

Only on the LUCAS is the spindle sleeve and spindle driven direct through Vee Belts, and the unmeshed gears, used on low and medium speed ranges, supply the necessary flywheel action for balanced carbide milling, boring and drilling. All LUCAS models incorporate this important feature in their design — All LUCAS machines answer the demand for greater production at lower cost with unexcelled precision. Ask for a LUCAS engineer to call — he can advise you on problems of Boring, Milling and Drilling!

LUCAS

MACHINE TOOL COMPANY

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MANUFACTURING EXCLUSIVELY 3, 4 and 5 INCH SINGLE SPINDLE HORIZONTAL BORING, DRILLING AND MILLING MACHINES

LEARN HOW TO CUT COSTS WITH GREENLEE MACHINES

SEE HOW AUTOMATIC TRANSFER-TYPE PROCESSING MACHINES CUT COSTS

Modern mass production requirements offer many opportunities for the use of machines of this type — on which a large number of operations can be performed, with the pieces being transferred automatically from station to station through the machine. Costs are slashed by reduction of idle time, elimination of work-handling, combination of processes, and efficient use of floor space. Greenlee has pioneered in the design and manufacture of these machines since 1934 — this booklet traces their development and illustrates outstanding examples of successful applications.

AUTOMATIC TRANSFER PROCESSING MACHINES
GREENLEE
AUTOMATIC TRANSFER-TYPE PROCESSING MACHINES
Facts Concerning the Development and Use of Transfer-Type Multiple Spindle Drilling, Boring and Tapping Machines
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OF PRECISION-THREADED PARTS
INSURES UNIFORM HIGH QUALITY RESULTS-REDUCES SCRAP LOSSES
CUTS PRODUCTION COSTS - INCREASES WORK HANDLING CAPACITY
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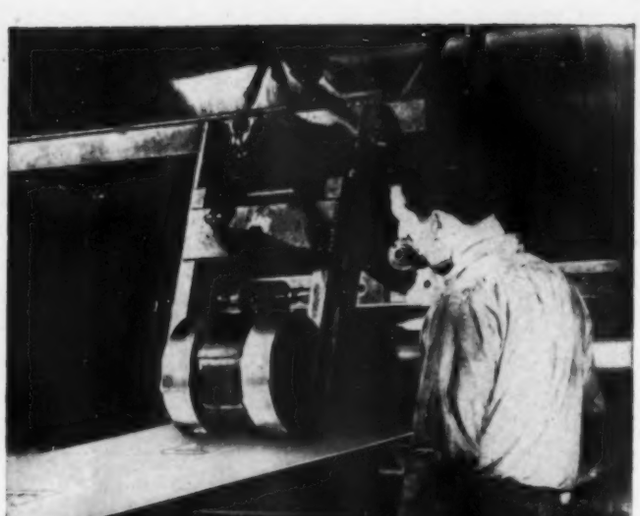

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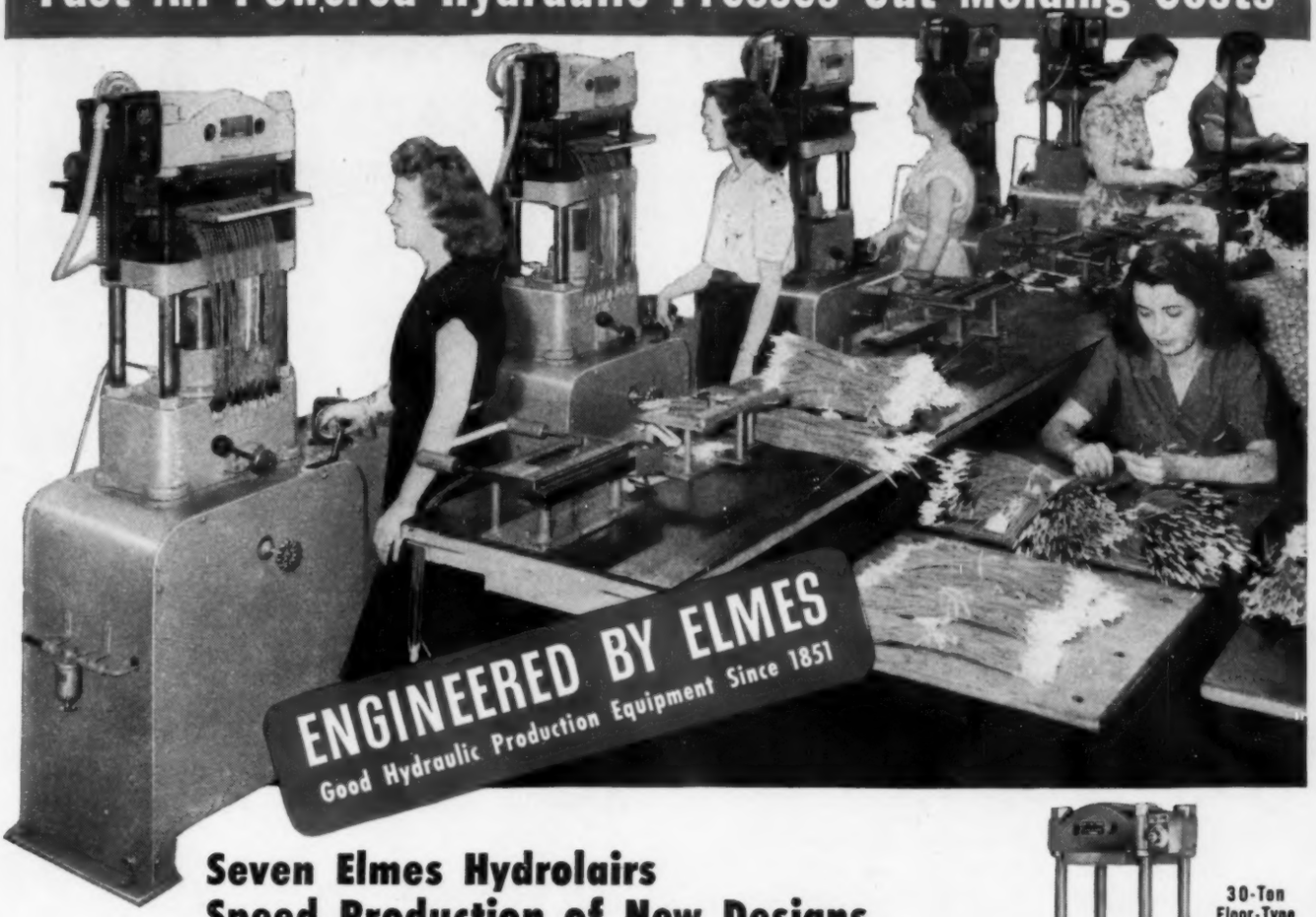

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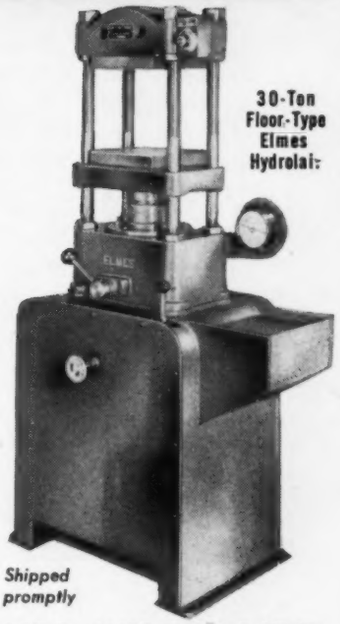

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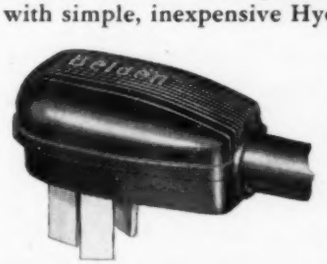

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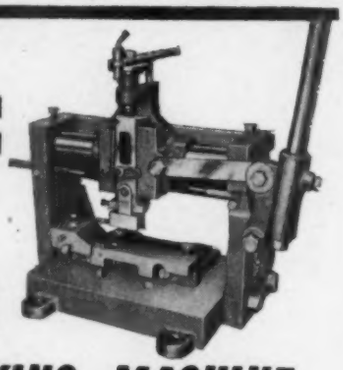

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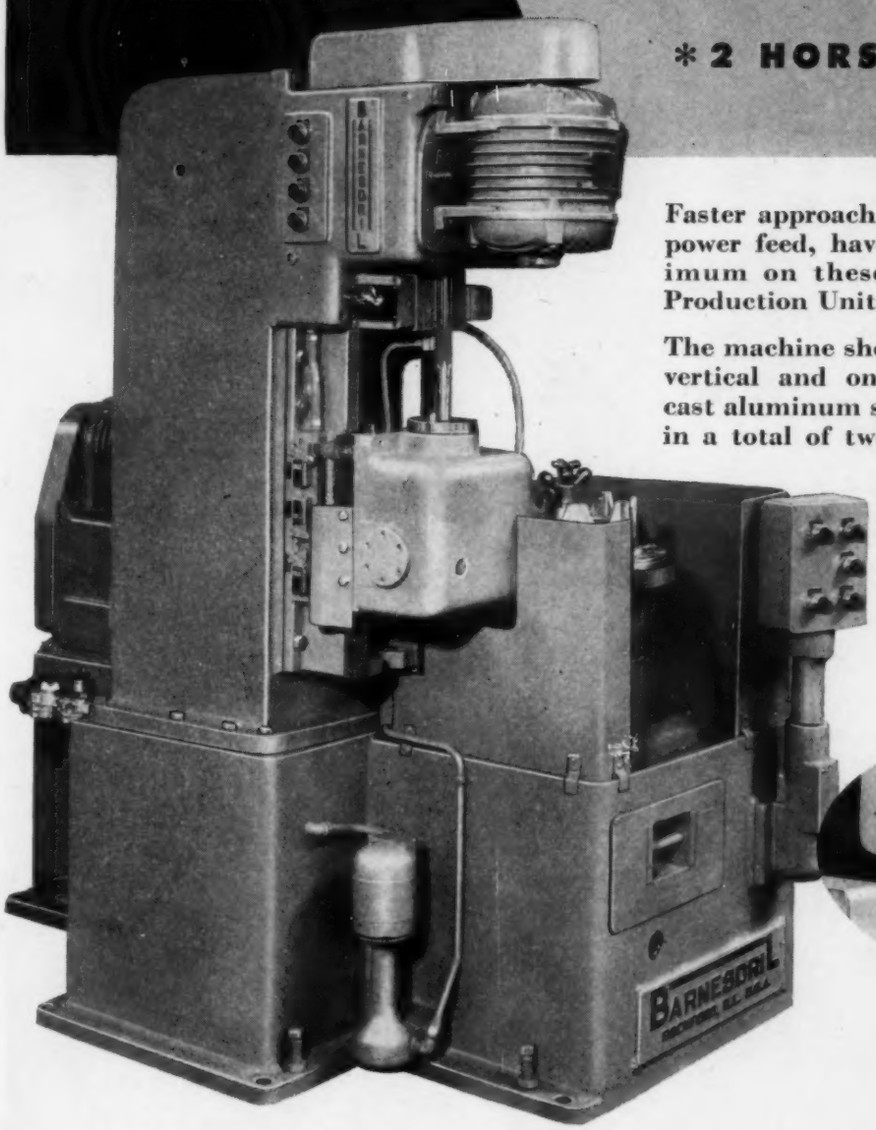

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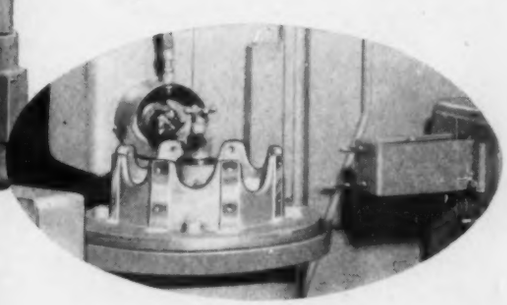

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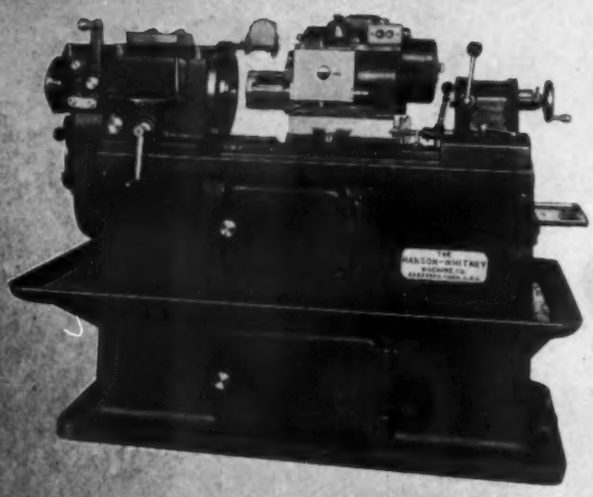

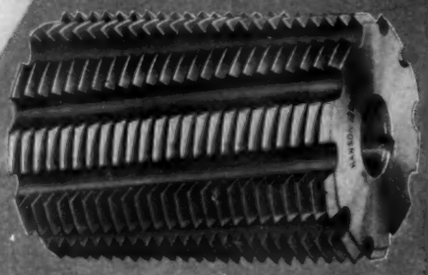

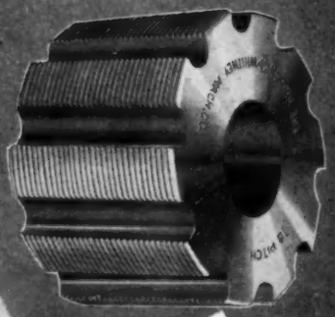

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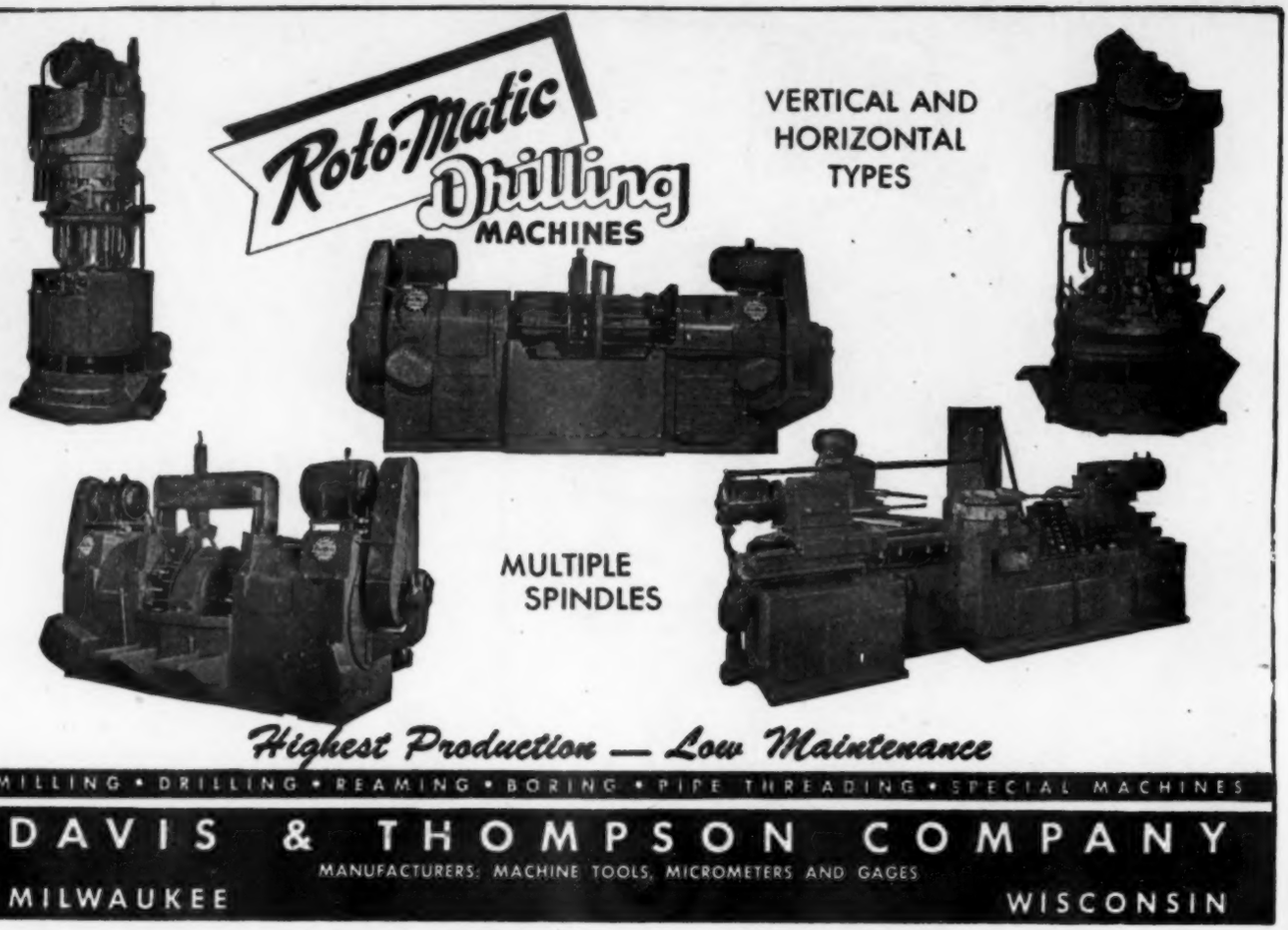

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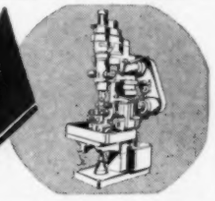

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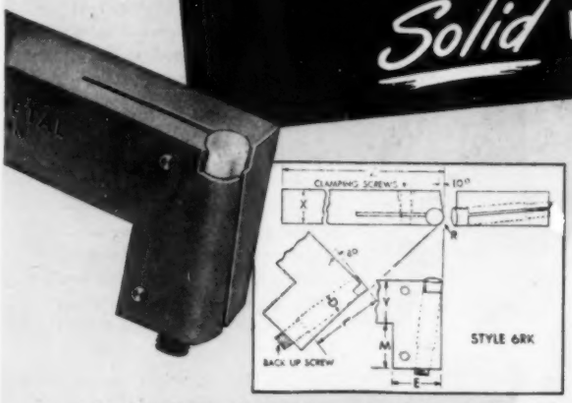
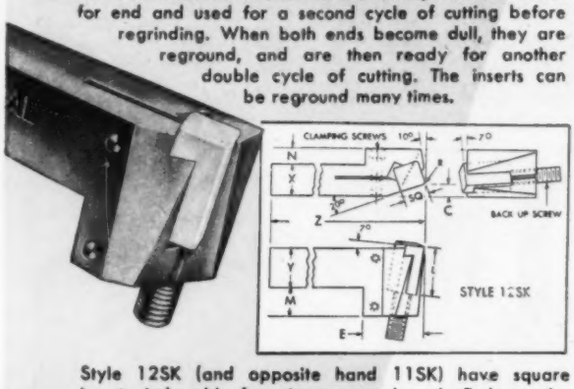
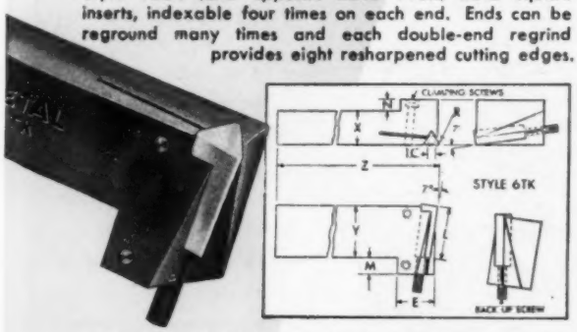


Style 6RK (and opposite hand 3RK) have cylindrical inserts that can be indexed several times, then turned end for end and used for a second cycle of cutting before regrinding. When both ends become dull, they are reground, and are then ready for another double cycle of cutting. The inserts can be reground many times.



Style 12SK (and opposite hand 11SK) have square inserts, indexable four times on each end. Ends can be reground many times and each double-end regrind provides eight resharpened cutting edges.



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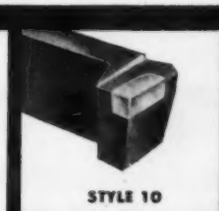
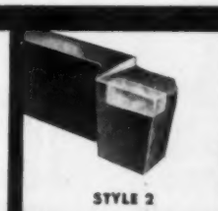

STYLE 10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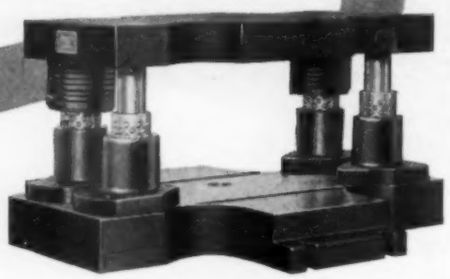

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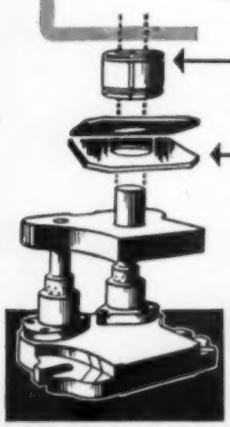

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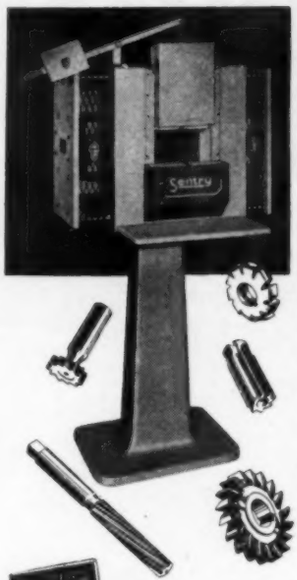

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You'll see the name of the blade you want to use — hand, power or band saw — opposite the type of material you want to cut. You'll see this valuable information quickly, easily, when you tack the new Victor wall chart over your tool crib or in your machine shop.

What's more you'll get a lot of inside tips on how to get longer life, the best use, from every blade... There are plenty of ways to cut costs, make money, on this new Victor Wall Chart... It's printed clearly, attractively, and it's yours absolutely FREE.

Drop in on your Victor supplier — or send him a card today. ***The supply is limited.*** Also see him the next time you want the finest in cutting performance. He carries a full line of Victor blades—one for every job a hack saw or a band saw can do. Victor blades cut better, too, on metals, plastics, and other nonmetallics... cut faster, cleaner, last longer.

3708

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MIDDLETOWN, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades

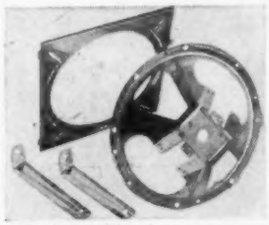
What's YOUR PROBLEM in finishing Zinc, Cadmium . . .

EYE-APPEAL?

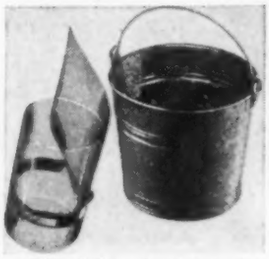
RUSTPROOFING?

BASE FOR PAINT?

Whatever your problem in finishing zinc or cadmium, there's an Iridite* to do the job. Iridite, a quick-dip, chemical treatment, offers you these three advantages—



Radio and hardware parts, permanently brightened with Iridite.



Wire cloth and galvanized bucket, Iridited for extreme corrosion-resistance.

Hardware products, Iridited and painted for peak finishing system efficiency.

1. EYE APPEALING FINISH

On plated parts Iridite forms a long lasting, sparkling *bright* finish that *stays bright,* even after handling, storage, exposure. On all surfaces, Iridite can be used to produce a variety of colored finishes.

2. RUSTPROOFING . . .

Resistant to the attack of water, gasoline, and ordinary corrosive conditions, Iridite provides the ideal *final finish* for all zinc and cadmium surfaces.

3. BASE FOR PAINT . . .

On any zinc or cadmium surface that must be painted, Iridite insures a better finishing system because the coating improves initial paint adherence, blocks corrosion *under* paint, blocks formation of metallic soaps *between* paint and metal.

- **Tell us the type of finish you need for zinc or cadmium—let us tell you how Iridite can help. For information and samples, write to:**

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4004 EAST MONUMENT STREET • BALTIMORE 5, MD.
Manufacturers of *REG. U.S. PAT. OFF

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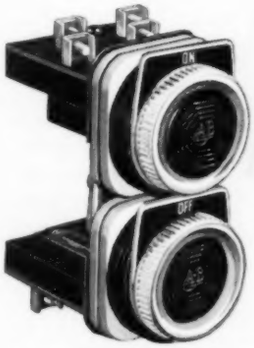
Oiltight Push Buttons

Pilot light with step-down transformer for low-voltage lamp. Bayonet-base bulb with sturdy filament gives long lamp life, especially when pilot light is subjected to vibration.



Two-button, maintained-contact control station. ON button closes the control circuit, which remains closed until pressure on OFF button releases the ON button and opens the control circuit.

The new Allen-Bradley oiltight push buttons consist of two parts . . . the "operator" or push button and the "contact block" or contact-making mechanism. When assembled, "operator" and "contact block" make a complete push-button unit.

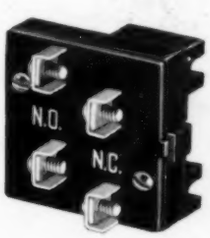
Five different types of "operators," as illustrated above, are available with a variety of nameplates, such as Jog, Start, Stop, Plug, Forward, Reverse, Up, Down, etc. The "operators" can be used interchangeably with several types of "contact blocks."

The "operator" contains an internal diaphragm to prevent oil seepage into the "contact block." In addition, packing washers make an oiltight seal between "operator" and mounting surface.

The "contact blocks" can be furnished with normally open and normally closed contacts to suit any requirement. Pilot lights, in several colors, harmonize in size, appearance, and construction with the push buttons.

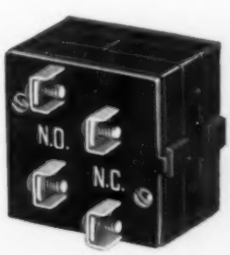
A bulletin on A-B oiltight push buttons will be sent on request.

Allen-Bradley Co., 1316 S. Second St.,
Milwaukee 4, Wisconsin



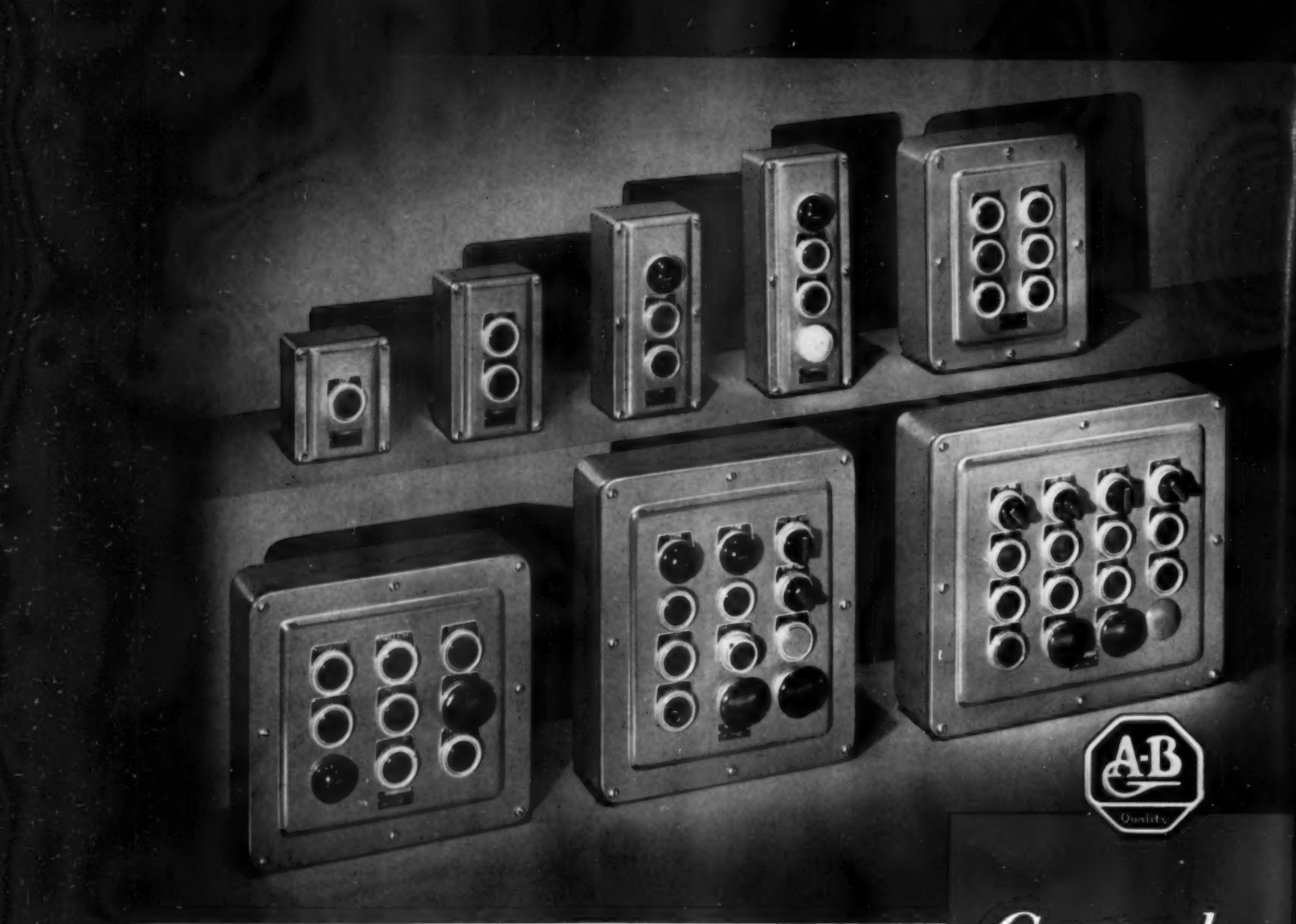
Left—Close-up of single deck "contact block" with one normally open and one normally closed control circuit.

Right—Close-up of double deck "contact block" with two sets of normally open and normally closed contacts.



ALLEN-BRADLEY

TROUBLE-FREE MOTOR CONTROLS



Control Stations with Oiltight Buttons

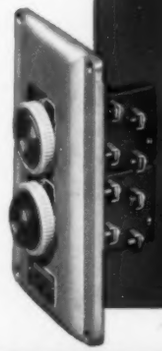
Typical examples of Allen-Bradley multiple-button oiltight stations are shown above. Other arrangements can be furnished.

The cast bases and bolted covers are machined and fitted with oiltight gaskets. All buttons and pilot lights have double, oiltight seals to keep oil away from contact mechanisms.

Push buttons are of compact design with minimum extension above cover plate . . . a valuable safety feature.

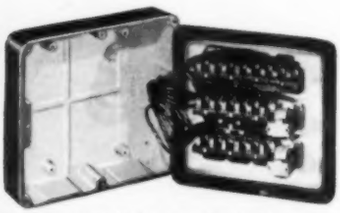
Send for bulletin on oiltight push buttons.

Allen-Bradley Company
1316 S. Second St., Milwaukee 4, Wis.



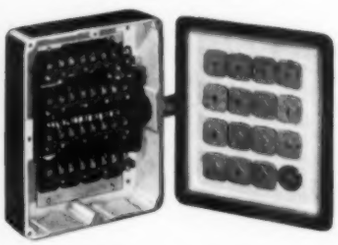
A-B oiltight push buttons can be furnished with cast cover plates for mounting in machine base cavities.

THE USUAL WAY



Conventional design calls for long, flexible lead wires to permit lifting of cover. Wires are in the way and loose connections can occur.

THE BETTER WAY



A-B has developed a better way for wiring complex control stations. Push buttons are mounted in cover plate; "contact blocks" are mounted in base. No wiring is needed to cover. Buttons register accurately above "contact blocks" when cover is replaced.

ALLEN-BRADLEY
MOTOR CONTROL

FREE LITERATURE

New Catalogs, Booklets, Bulletins

(Not good after March 1, 1948)

MACHINES AND ATTACHMENTS

1 DIE-LESS DUPLICATING—O'Neil-Irwin Mfg. Co., Lake City, Minn. 40-page booklet 47-12 gives information on the Di-Acro system of die-less duplicating and contains illustrations and specifications covering all Di-Acro benders, brakes, shears, and rod parters.

2 LATHES — Western Machine Tool Works, Holland, Mich. 16-page bulletin 4240 describes and illustrates Chard line of lathes including multi-speed, manufacturing, and cone-head engine lathes.

3 TAPPING MACHINE—The Cleveland Tapping Machine Co., Hartville, Ohio. 10-page catalog describes with illustrations the new Model E lead-screw tapping machine available in six sizes.

4 CONTOUR GRINDING — Thompson Grinder Co., Springfield, Ohio. 12-page catalog T-947 covers with illustrations and specifications their crushed wheel-grinding process known as Thompson Truforming, for accurate contours in hard metals.

5 PRODUCTION OPERATOR — Production Tool & Die Co., Inc., 572 St. James Ave., Springfield, Mass. 4-page bulletin describes the Pond Production Operator "200," a controlled feeder for bar stock that can be attached to any production miller.

6 PRODUCTION MACHINES — The Morris Machine Tool Co., Cincinnati 3, Ohio. 16-page bulletin covers the Mor-Speed production machines which integrate into one assembly, operations that are usually performed on individual machines. Sold by Pratt & Whitney, Div., Niles-Bement-Pond Co., West Hartford 1, Conn., Agency Sales Dept.

7 PUNCH PRESS—Pacific Tool & Die Co., Los Angeles 43, Calif. 4-page bulletin covers the Seele Models No. 35 and 70 inclinable punch presses with detailed specifications.

8 STRAIGHTENING, CUTOFF MACHINE—Dore Mfg. Co., Inc., Grayling, Mich. 12-page catalog describes and illustrates line of Wiro-matic machinery, including wire straightening and cutoff, also spinner and reel machinery.

9 FORGING—The Champion Machine & Forging Co., Cleveland 5, Ohio. 4-page pamphlet gives information about cost reductions and quality control achieved by forging a specific part in closed impression dies.

10 TRACER-CONTROLLED MILLING—Pratt & Whitney, Div., Niles-Bement-Pond Co., West Hartford 1, Conn. 16-page catalog 495 illustrates and describes the Keller, type BG, for automatic tracer-controlled milling. Specifications are included.

11 PRESSES—Walsh Press & Die Co., Chicago 44, Ill. 4-page bulletin covers line of presses and includes information on special presses and accessories. Specifications are given on the open-back inclinable presses.

12 AUTOMATIC MACHINES — The New Britain Machine Co., New Britain-Gridley Machine Div., New Britain, Conn. 12-page catalog includes information on automatic screw, automatic chucking, precision boring machines, and automatic turret lathes.

13 UNIVERSAL PRESS—Rodgers Hydraulic Inc., Minneapolis 16, Minn. 8-page pamphlet 229 includes material on a universal hydraulic press that is portable, light in weight and develops to 200 tons pressure.

14 BUFFING, POLISHING MACHINES—Standard Electrical Tool Co., Cincinnati 4, Ohio. 16-page catalog B-10 illustrates their line of heavy-duty and extra heavy-duty buffing and polishing machines in sizes ranging from ⅓ to 60 hp., as well as the infinitely variable-speed machines with Speedial control.

15 VAPOR DEGREASERS — G. S. Blakeslee & Co., Chicago 50, Ill. 20-page catalog on solvent vapor degreasers for cleaning of parts of all metals and alloys, without the need of rinsing or drying operations.

TOOLS AND ACCESSORIES

16 WRENCHES—Blackhawk Mfg. Co., Milwaukee 1, Wis. 36-page booklet 247 lists socket, box-type and open-end wrenches and sets, including new Nugget double-duty drive socket wrenches.

17 AIR GAGE—Federal Products Corp., Providence 1, R. I. 12-page bulletin illustrates and describes the Metricator dimensional air gage. Unit includes positive, automatic pressure control.

18 PRESS ROOM EQUIPMENT — Durant Tool Supply Co., Providence 3, R. I. 4-page pamphlet gives information on roll feeds, stock oilers, and stock reels.

19 INVOLUTE SPLINE CUTTING TOOLS—Illinois Tool Works, Chicago 39, Ill. Booklet contains tool recommendations for the production of involute splines in accordance with the recently adopted American Standard of Involute Splines.

20 MAGNETIC CHUCKING—Hanchett Mfg. Co., Big Rapids, Mich. 18-page bulletin covers the Hermeti-Coil magnetic chucks and accessories. These chucks can be used in heavier machining operations such as planing, milling and shaping.

21 BORING TOOLS—Kaukauna Machine Corp., Kaukauna, Wis. 6-page bulletin gives data on Kwik-Size boring tools with typical industrial boring applications illustrated. Full range of head sizes are covered.

22 WHEEL DRESSER—Carboloy Co., Inc., Detroit 32, Mich. 18-page booklet DR-480 describes their line of diamond impregnated cemented carbide grinding wheel dressers. A number of small diamonds are used instead of one large diamond per dresser.

23 SELF-OPENING DIEHEADS—The Geometric Tool Co., New Haven 15, Conn. 12-page bulletin DS-3 illustrates and describes the improved style DS convertible self-opening diehead. Unit is actually four dieheads in one as it can be used in four different applications by a simple adjustment for each.

24 GEAR TEETH DESIGN—Illinois Tool Works, Chicago, Ill. 14-page booklet gives detailed descriptions and illustrations in the design, proportioning and dimensioning of gear teeth.

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25 CARBIDE TOOLS—Schmarje Tool and Engineering Co., Muscatine, Iowa. 10-page bulletin 147 lists extra precision diamond lapped carbide-tipped reamers, spotfacers, and centers. Illustrations and specifications are included.

26 INDICATING RECORDERS—Leeds & Northrop Co., Philadelphia 44, Pa. 16-page pamphlet ND44(2) lists all Micromax model R indicating recorders and controllers. Included are complete specifications in tabular form.

27 MIDGET MILL—Severance Tool Industries Inc., Saginaw, Mich. 12-page bulletin 16-M lists Midget Mills and also ground carbide hand files and die machine files. Latest description and listing of Micro-mills are included.

28 AIR GAGES—Moore Products Co., Philadelphia 24, Pa. 24-page booklet 804 features principles of operations and application data for their standard pneumatic comparator gages which measure I.D. and O.D.

29 BURS AND ACCESSORIES—Pratt & Whitney, Div., Niles-Bement-Pond Co., West Hartford 1, Conn. 36-page booklet gives general information concerning burs as well as detailed specifications with illustrations on varied types of Master-Ground burs.

30 TOOLS, CARBIDE PARTS—Carboloy Co., Inc., Detroit 32, Mich. 65-page catalog GT-200 lists standard cemented carbide products, with specifications and prices. Included are solid boring bars, solid boring tools, and solid unground rod.

HEAT-TREATING AND WELDING

31 INDUCTION FURNACES—Ajax Electrothermic Corp., Trenton 5, N. J. 14-page bulletin 14-A describes induction furnaces powered by 20 and 40-kw. converters. Advantages, principles of operation, specifications, and performance data are covered.

32 CARBO-NITRIDING FURNACE—Holcroft & Co., Detroit 10, Mich. 4-page bulletin describes operation of this process, and lists numerous possible furnace-design features. Typical installations are illustrated and described.

33 SMALL HEAT-TREATING FURNACES—Cooley Electric Mfg. Corp., Indianapolis, Ind. Pamphlets 70, 71, 72, 73, 74, 75 and 76 cover line of box and recirculating air draw furnaces. Box furnaces have automatic control available.

34 CARBIDE BRAZING—Adamas Carbide Corp., New York 23, N. Y. 12-page pamphlet gives complete instructions on how to braze carbide. Pamphlet is illustrated and describes the equipment and materials, brazing by torch, furnace or induction, and how to "sandwich" braze.

35 WELDING ACCESSORIES—Metal & Thermit Corp., New York 5, N. Y. 14-page bulletin 120 illustrates and describes their complete line of welding accessories. Included are cable connectors, cable lugs, splicers, cleaning tools and many other items.

PLANT SERVICE EQUIPMENT

36 CLEANING EQUIPMENT—Phillips Mfg. Co., Chicago 45, Ill. 46-page booklet illustrates and describes vapor degreasers, torrent power washers, and metal cleaning equipment. Specifications are given throughout.

37 VIBRATION MOUNTS—Hamilton Kent Mfg. Co., Kent, Ohio. 8-page bulletin covers Rexon vibration mounts, which are made in different sizes for varying weight loads, and require no special supports or machine alterations.

38 INDUSTRIAL VACUUM CLEANING—Doyle Vacuum Cleaner Co., Grand Rapids, Mich. 6-page pamphlet gives information on three Doyle Vac-it models as well as proper attachments.

39 TRUCKS—Standard Pressed Steel Co., Jenkintown, Pa. 12-page catalog 624 illustrates and describes with specifications Hallowell line of steel platform trucks as well as parts and accessories.

40 CLARK LINE—Clark Equipment Co., Buchanan, Mich. 30-page booklet illustrates and describes Clark's line of products including carbide cutting tools, steel castings, metal spoke wheels, axles, transmissions, trucks, gears, and forgings.

PARTS AND MATERIALS

41 BALL BEARINGS — The Federal Bearings Co., Inc., Poughkeepsie, N. Y. 260-page catalog "K" contains 100 pages of engineering information and data. All types of anti-friction bearings produced by Federal are described. Interchangeability and conversion tables are incorporated.

42 STAINLESS STEELS—The American Rolling Mill Co., Middletown, Ohio. 38-page catalog includes complete information on cutting rates and tool composition for each grade of Armco stainless steel. It also gives helpful hints for correct grinding, milling, and drilling.

43 AIR CYLINDERS—Miller Motor Co., Chicago 18, Ill. 8-page bulletin gives information on air cylinders from 1½- to 14-in. bores. Single and double rod end non-rotating cylinders are shown with or without cushions.

44 ELECTRONIC SCRIBER—Wheelco Instruments Co., Chicago 7, Ill. 16-page data book on the Capacilog gives operational diagrams, schematic drawings, charts and listings that explain the diversified functions of the strip chart recorder.

45 CONTROL VALVES—The Sinclair-Collins Valve Co., Akron 11, Ohio. 20-page pamphlet gives parts lists, dimensions, and valve capacity charts for liquids, steam and gases for their direct-acting and reverse-acting control valves.

46 SELF-PRIMING PUMP — Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. 8-page bulletin 08B6319B illustrates and describes an automatic, self-priming pump equipped with a new type automatic spring valve. Pump is used for transition from priming or vacuum pumping to straight centrifugal action.

47 VOLTAGE CONTROL—The Superior Electric Co., Bristol, Conn. 12-page bulletin 547 includes performance and engineering data on voltage control, and features latest developments in Power-stat variable transformers and Stabiline automatic voltage regulators.

48 BUILT-IN MOTORS—The Louis Allis Co., Milwaukee 7, Wis. 14-page bulletin 516-D covers the line of type CT rolled-shell, shaftless squirrel-cage induction motors for built-in drives.

49 PHOTOGRAPHIC PAPER—Eastman Kodak Co., Rochester 4, N. Y. 8-page pamphlet describes Kodagraph Autopositive paper, a silver-sensitized paper for reproducing engineering drawings in normal room illumination with standard blueprint or direct-process printers.

50 SELF-LOCKING NUTS—Standard Pressed Steel Co., Jenkintown, Pa. 14-page pamphlet 619 illustrates and describes Flexloc nuts with specifications. Nut is made in one solid piece from top to face.

51 POWER UNIT—John S. Barnes Corp., Rockford, Ill. 10-page pamphlet covers the Rapidraulic Junior, a hydraulic unit particularly designed for clamping and similar applications.

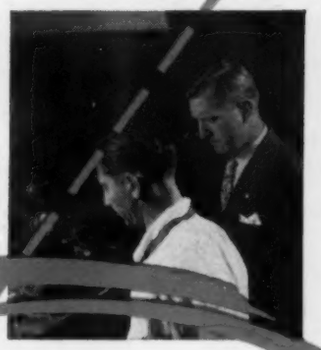
52 HYDRAULIC OILS—E. F. Houghton & Co., Philadelphia 33, Pa. 48-page booklet contains seven chapters, with specifications and properties for a good hydraulic oil. Houghton's fortified hydraulic oil, Hydro-drive, and Houghton Service are described.

53 LEATHER BELTING — Chicago Belting Co., Chicago, Ill. 24-page booklet describes their improved tension welded leather belting. Illustrations cover various applications and methods of production.

54 WOVEN WIRE CONVEYOR BELTS—Cambridge Wire Cloth Co., Cambridge, Md. 56-page booklet covers woven wire conveyor belts for industrial applications. Six sections cover metals used, types, design, installation, and applications.

55 VARIABLE-SPEED CONTROL—Reeves Pulley Co., Columbus, Ind. 114-page catalog covers, with engineering data and tables, Reeves variable speed transmission, vari-speed motor pulley, and vari-speed motordrive. Construction details and industrial applications are given.

Are *you* getting the advantage of this specialized lubrication engineering service?



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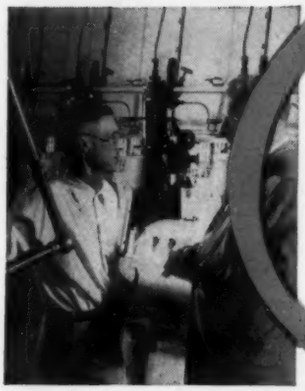
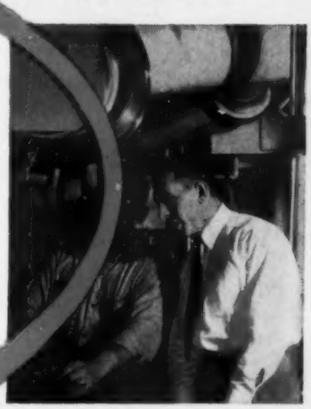

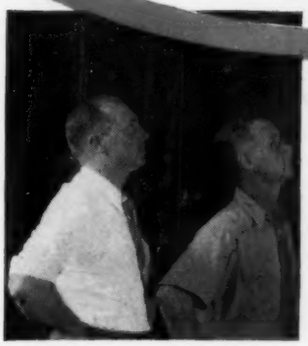

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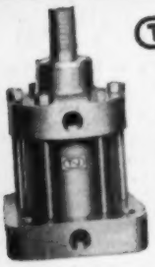

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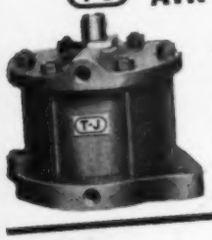
T-J AIR CYLINDERS



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T-J CLINCHORS

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Die sinking milling cutters for accuracy, sturdiness and more work between grinds. All standard types and sizes.

T-J AIR CONTROLS

Designed for air cylinders in semi-automatic or automatic operating cycles. Easy to install.

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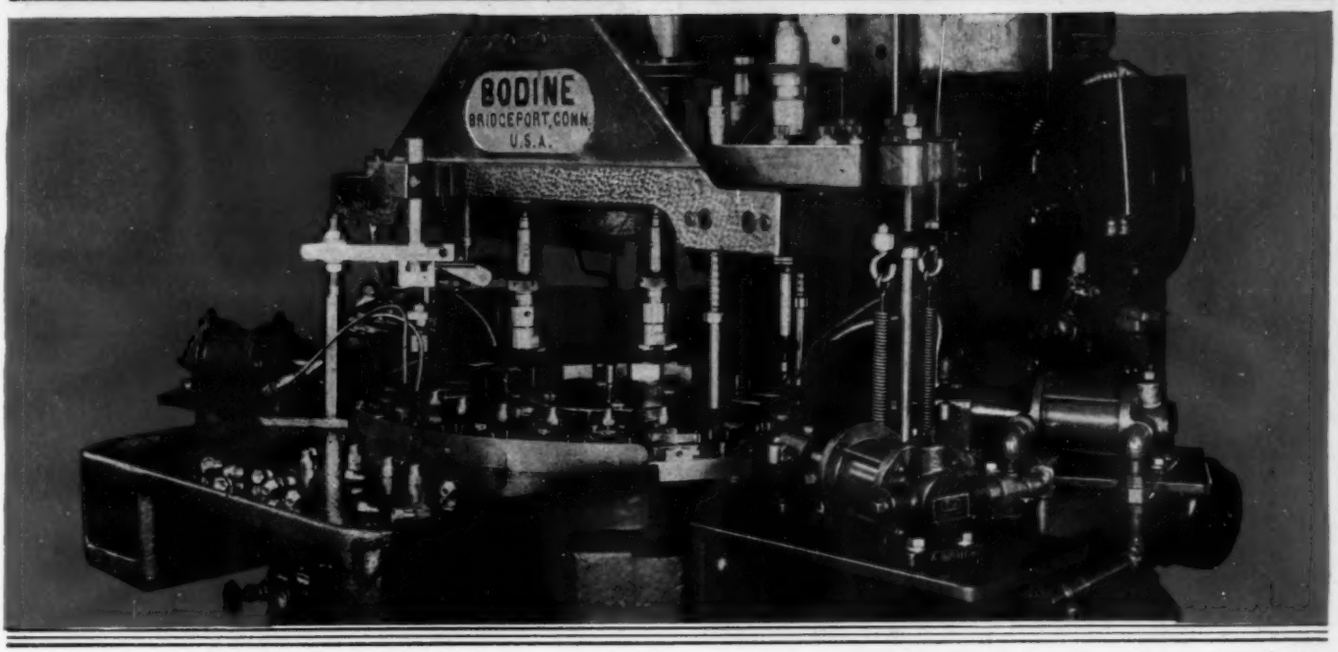
A Round Table Discussion

ON SMALL PARTS PRODUCTION.....



he low cost, repetitive production of small metal components . . . that require several operations, such as Drilling, Milling, Tapping and Screw Inserting . . . has been solved by many leading plants, with Bodine machines.

The Bodine basic design employs multiple spindles, each performing its own operation at a given station on work positioned by an automatic indexing horizontal dial. There are six standard size machines which may be tooled to provide for a multiplicity of operations.

Bodine engineers invite your inquiries for solution of specific problems . . . no matter how difficult they may appear. When you consider that spindles may operate vertically, horizontally, at any angle or from an inverted position, it is evident that production possibilities are almost unlimited . . . within the range of the smallest commercial tools up to ½" taps and drills. Spindle speeds rate to 20,000 r.p.m.

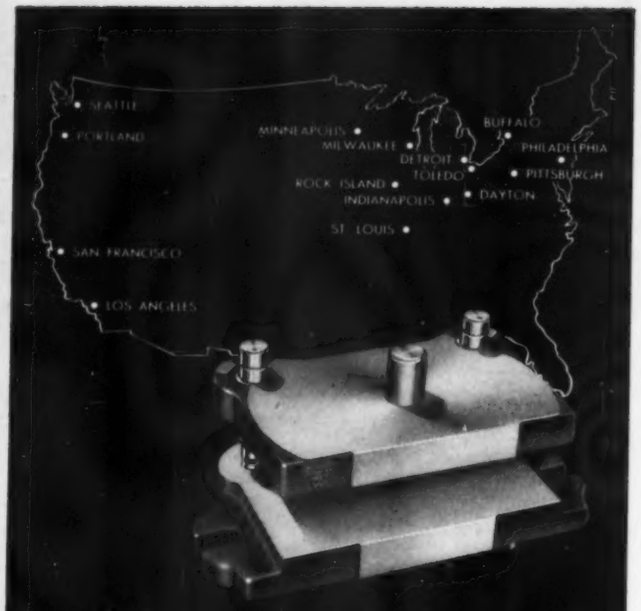
Check your present production of small parts . . . and ask us for recommendations to increase speeds, lower costs.

THE **Bodine** CORPORATION
BRIDGEPORT 5 · CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

WRITE FOR *Interesting Bulletin*

Send for completely illustrated bulletin showing actual jobs, specifications, design of basic Bodine principle . . . and how Bodines are adapted to your needs.

1BD48



Representation throughout Industrial America

Micro-metric jig-bored die sets in commercial or precision grades are available to you through the DETROIT DIE SET representative in your community. Phone or write for prompt delivery of standard and special die sets and high-precision die maker's supplies.

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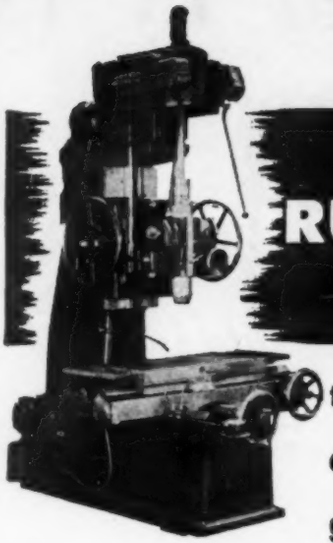
DETROIT DIE SETS ★



A RUTHMAN PUMP

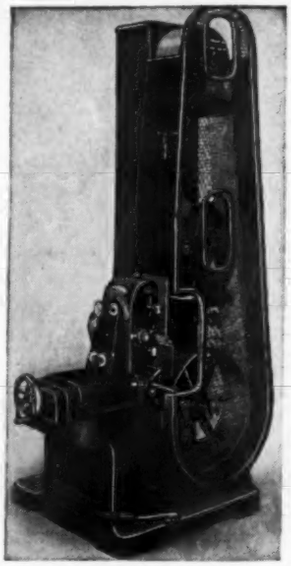
to speed production
cut maintenance costs
give long service

Photo Courtesy:
Fosdick Machine Tool Co.
Cincinnati, Ohio

Instantaneous coolant flow, split-second control from a trickle to full volume, speeds production in your metal-cutting operations. Pre-lubricated over-sized bearings, one-piece dynamically balanced shaft, no metal-to-metal contact reduces wear and assures long trouble-free service for Ruthman Gusher Coolant Pumps.

Illustrated is a Fosdick #30 Jig Borer equipped with a ¼ Model UL-7120 Ruthman Gusher Coolant Pump. *Ask for Catalog 10-A.*

THE RUTHMAN MACHINERY CO.
1818 Reading Road Cincinnati, Ohio



Cylindrical or tapered work can be handled automatically on

The "PRODUCTION" Type A HIGH SPEED POLISHING MACHINE

An outstanding advantage of this recent "Production" development in high speed, centerless feed polishing machines, is the fact that no centering or chucking are required. Work is merely fed automatically by a power feed attachment.

Where desired, work can be fed to a stop and finishing limited to that portion of the abrasive belt which is to be finished. Regardless of how used, this machine can be operated by unskilled labor with assured results in speed and high quality finish.

A Taper Feed Attachment is available for application to this machine for feeding tapered cylindrical work.

Specifications

Capacity (with power feed attachment) — ¼" to 6" dia.
Speed leather cushion belt—6300' per min.
Floor Space—40" x 50".
Motor—10 H.P.

Write for illustrated literature giving full information.

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

NOW IS THE TIME FOR YOU TO TRY

In these days of long delivery, wide-awake plants are using Masonite* Die Stock in their tooling operations. For this durable, time-proved material is available for immediate delivery.

You can quickly produce dies, jigs, fixtures and other tools with Masonite Die Stock. It machines easily with wood- or metal-working tools. You'll find it ideal for fabricating sheet metals—especially aluminum, copper and brass. It won't check, split, shrink or twist. Weighs only one-sixth as much as steel or cast iron. Comes in panels 48x72 and 48x144 inches—¼ to 2 inches thick. Easily laminated to greater thickness.

Don't let the scarcity of certain materials halt your production. Try Masonite Die Stock. Besides its great merit on production runs, many industries have found it valuable for experimental tooling, mock-ups and models.

*"Masonite" is a trade-mark registered in the U. S. Pat. Off., and signifies that Masonite Corporation is the source of the product.

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MAIL THIS COUPON **TODAY** FOR COMPLETE DETAILS!

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Please send me a free copy of your illustrated, information-packed "Masonite Die Stock Data Book."

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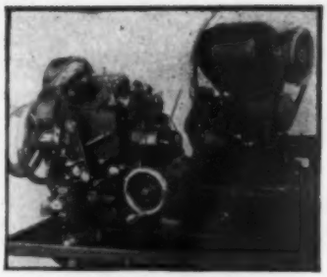
Firm and title _____

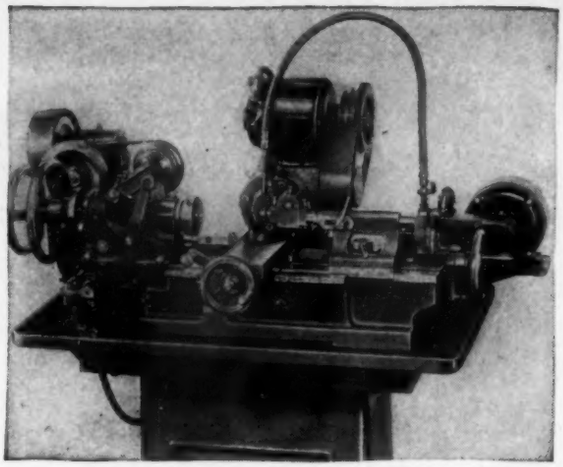
Address _____

City _____ Zone _____ State _____

Machine equipped with Internal Milling Attachment



Machine equipped with Relieving Head



ALL STANDARD FORMS OF THREADS CAN BE PRODUCED TO CLOSEST TOLERANCES ON

WALTHAM THREAD MILLERS

Three motors on these machines provide a wide flexibility in operation as well as a constant supply of coolant for all requirements. By simply changing ratios, speeds are suitable for cutting either brass or steel. Waltham can furnish cutters for any thread form desired.

Machines are mounted on cabinet base with two shelves inside. Standard equipment includes: three motors with push button start and automatic or push button stop—follow rest—one milling cutter—indexing device for cutting multiple threads—5 pitch lead screw—change gears for cutting from 5 to 40 threads per inch.

Special Equipment Extends Utility

Extra equipment includes: a special work head for relieving—a special motor driven cutter head for internal threading—a multiple cutter threading attachment—automatic cam operation—special tailstock for multiple cutter work—translating gears for cutting metric threads—metric lead screw—plain taper attachment.

Write for Bulletin 244A giving detailed information.

WALTHAM MACHINE WORKS

WALTHAM, MASS.

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TRADE MARK REGISTERED U.S. PAT. OFF.

OUR TOOL DESIGNING

saves you time and labor

Today when time is important, correct and efficient tool designing may make the difference between profit and loss. Our experience guarantees you tools—designed for economy of operation, resulting in your increased production at a lower cost.

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UNITS FOR MACHINE TOOLS
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For Every Job of Swaging
THERE IS AN
ETNA
ROTARY SWAGING MACHINE

6000 HAMMER BLOWS OF INFINITE FORCE PER MINUTE

- The dies and hammers rotate around the work, which is held stationary, quickly swaging it to desired size and shape.
- Built to handle the severest work with capacities up to 14 inches in diameter.
- Integral forced coolant and lubrication systems.
- Handle hot or cold work.
- Readily equipped with a variety of feeding devices.
- Cast alloy steel drum mounted on base and bolted to front housing.
- Timken bearings take spindle thrust. Radial ball bearing in rear of flywheel.
- Alloy steel forged, heat-treated and ground spindle.
- A taper fit is used for the fly wheel which is further secured by a split nut and key.
- Hammers, rolls and inner ring of heat-treated alloys.
- Motor is mounted over the machine on an adjustable bracket, the power being transmitted by V-belts.

WRITE FOR DESCRIPTIVE LITERATURE.

THE ETNA MACHINE CO.

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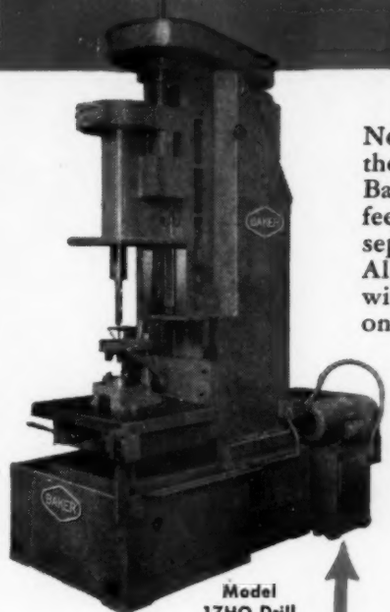
It's here... Versatile BAKER

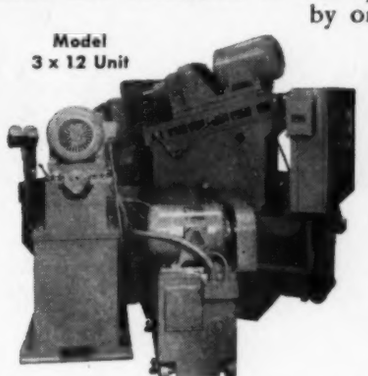
MOBILE HYDRAULIC FEED POWER UNIT

...outside the machine base!

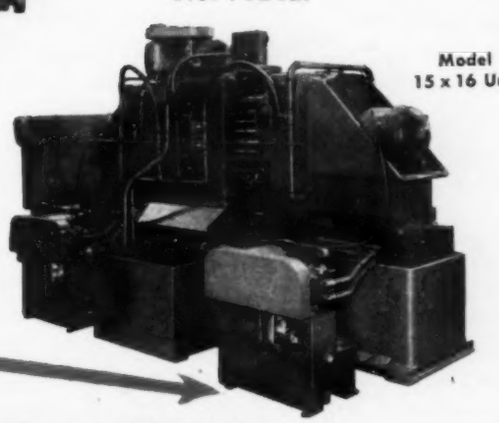


Model 17HO Drill

New Baker Mobile Hydraulic Feed Power Unit is designed for use with the three new Baker models illustrated. These new models include Baker 17HO hydraulic feed drill and Baker 3 x 12 and 15 x 16 hydraulic feed units for Special Machine application. The power unit is completely separate from the machine and requires only 19¼" x 31" of floor space. All the advantages of the permanent type hydraulic system are included, with the added utility provided by a mobile base.. Baker Unit is mounted on casters and connected to the operating cylinder of the machine by only two high-pressure hose lines. Lines are joined by self-sealing couplings which permit breaking the line without loss of hydraulic fluid or influx of air into the hydraulic system. The self-sealing connectors, together with the mobile base on casters, permit an exchange of units whenever desirable with a negligible loss of production time. For more information on the Baker Mobile Power Unit, write for circular No. 70242.



Model 3 x 12 Unit

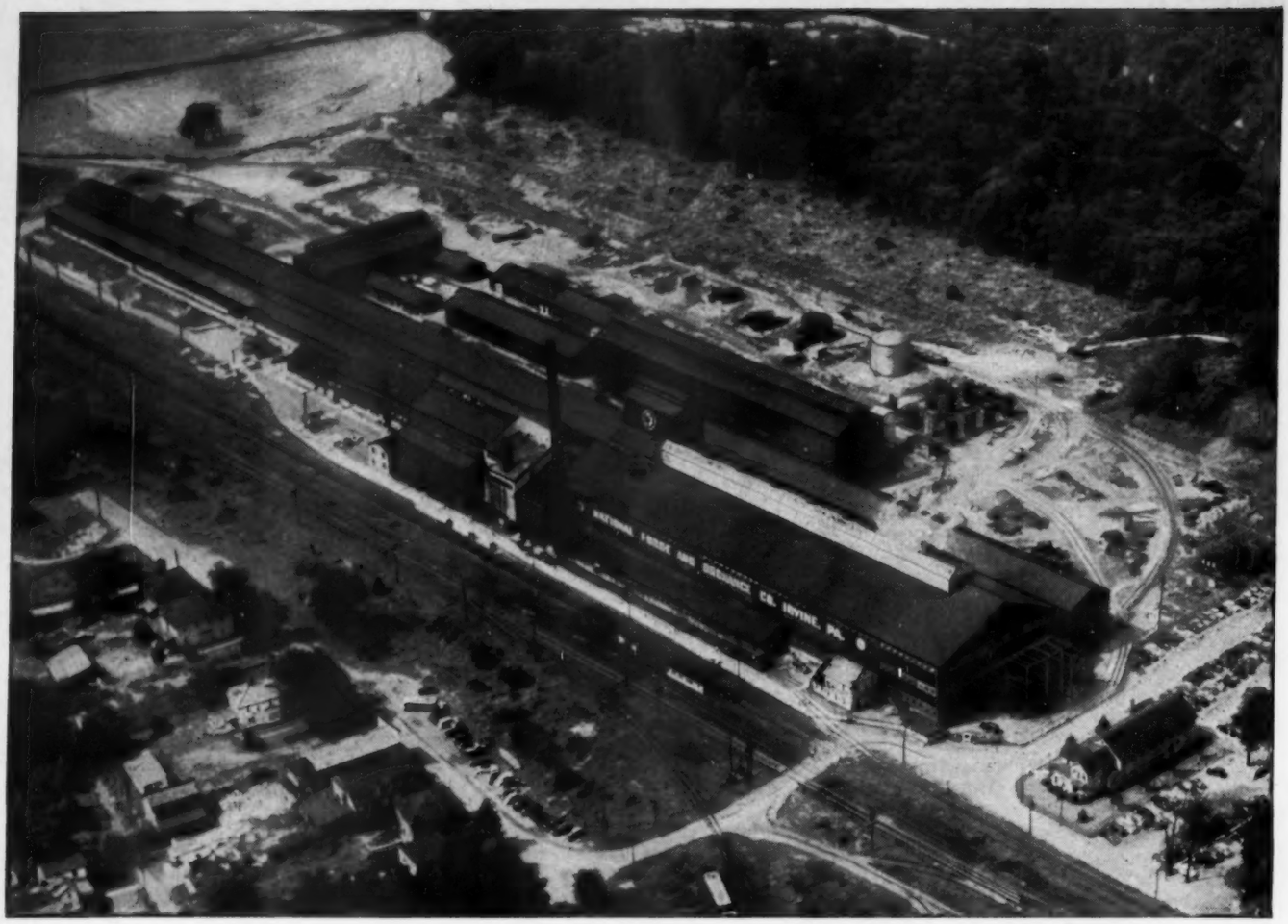


Model 15 x 16 Unit

BAKER MACHINERY...
ENGINEERED FOR PRODUCTIVITY
SINCE 1867

BAKER BROTHERS-Inc. TOLEDO OHIO

DRILLING - BORING - TAPPING AND KEYSEATING MACHINES



THIS IS THE PLANT WHERE THE BETTER STEEL FORGINGS WILL BE MADE IN 1948

Unless you have had occasion lately to fly over Irvine in Warren County, Pennsylvania, you have not seen this view of the National Forge plant before.

Greatly expanded in buildings, equipment and man power during the war years, National Forge is entering its 35th year. With exceptionally well balanced facilities for producing a vast range of steel forgings, whether weighed in pounds or tons, National Forge will continue to give the best in steel forging service.

Within this plant basic electric steel is made under rigid metallurgical and chemical laboratory control. National Forge makes its steel by the electric process—a melt for each forging—to assure steel of higher quality and cleanliness.

Forging equipment, manned by forgesmiths of long experience, shape this steel into forgings designed to possess the most desirable grain structure and physical properties. To acquire these desired characteristics modern heat treating facilities are provided. Both vertical and horizontal furnaces, equipped with the latest thermostatic control, are used for quenching, tempering, annealing, normalizing and spheroidizing. Vertical furnaces handle lengths up to 55 feet and horizontal furnaces take forgings up to 34 feet long.

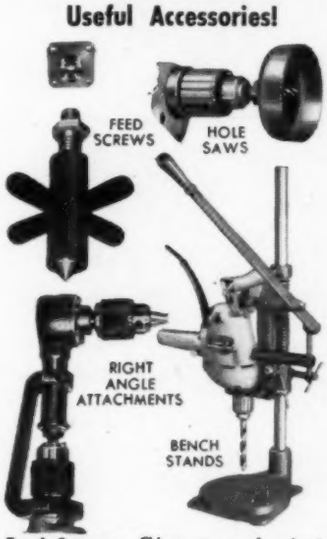
The main machine shop extends for an unbroken length of a quarter of a mile and contains machine tools of the most modern design as well as essential handling equipment for efficient machine shop operation. In addition to the machining of forgings, this machine shop also houses a large department for contract machine work and assembly.

You should know in detail the many better ways in which this plant can serve you. A word by mail will bring you the interesting "inside the plant" story. Just address the **National Forge & Ordnance Company, Irvine, Warren County, Pennsylvania.**

Black & Decker 5/8" Heavy-Duty Drill
drilling holes for door frame bolts
at Harrisburg Truck Body Co.

Black & Decker 1¼" Heavy-Duty
Portable Electric Drill
driving reamer to drill bungholes in barrels

Get More Work from Your DRILLS with these Useful Accessories!



Feed Screws—Give a mechanical "push" for constant, steady feed pressure, in close quarters.
Hole Saws—Cut clean, round holes in any material a hacksaw will cut; 5/8" to 4" diameters.
Right Angle Attachments—Help you drill and bore around corners, in close clearances.
Bench Stands—Quickly convert your portable drill to drill press use for accurate and heavy-duty work.

These RUGGED DRILLS Speed Up Heavy-Duty Work

Turn your toughest drilling jobs over to Black & Decker *Heavy-Duty* Electric Drills . . . and watch your output jump! These high-powered Drills handle *continuous,* heavy-duty drilling, wood boring and hole sawing. From spade handle to chuck, they're built to take it! Their heavy-duty, B & D-built motors are specially constructed for constant service. Heavy-duty gears and ball bearings are used throughout. Roller bearings on chuck spindle withstand severe side and end thrust for long, trouble-free operation.

Wherever you are, there's a Black & Decker Distributor near you. Ask him about these Heavy-Duty Drills today. Remember, he's as close as your phone and ready to help on *any* tooling problem. For your copy of our catalog, write to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland.

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Every man in your shop and other shops will find this practical Handbook of 1546 pages as useful as any tool in his kit.

Our spare time representatives in large and small shops have successfully sold thousands of copies of previous editions of the Handbook with profit to themselves.

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THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on Page 296 Nov. 6, '47 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
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AUTOMATIC EQUIPMENT
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HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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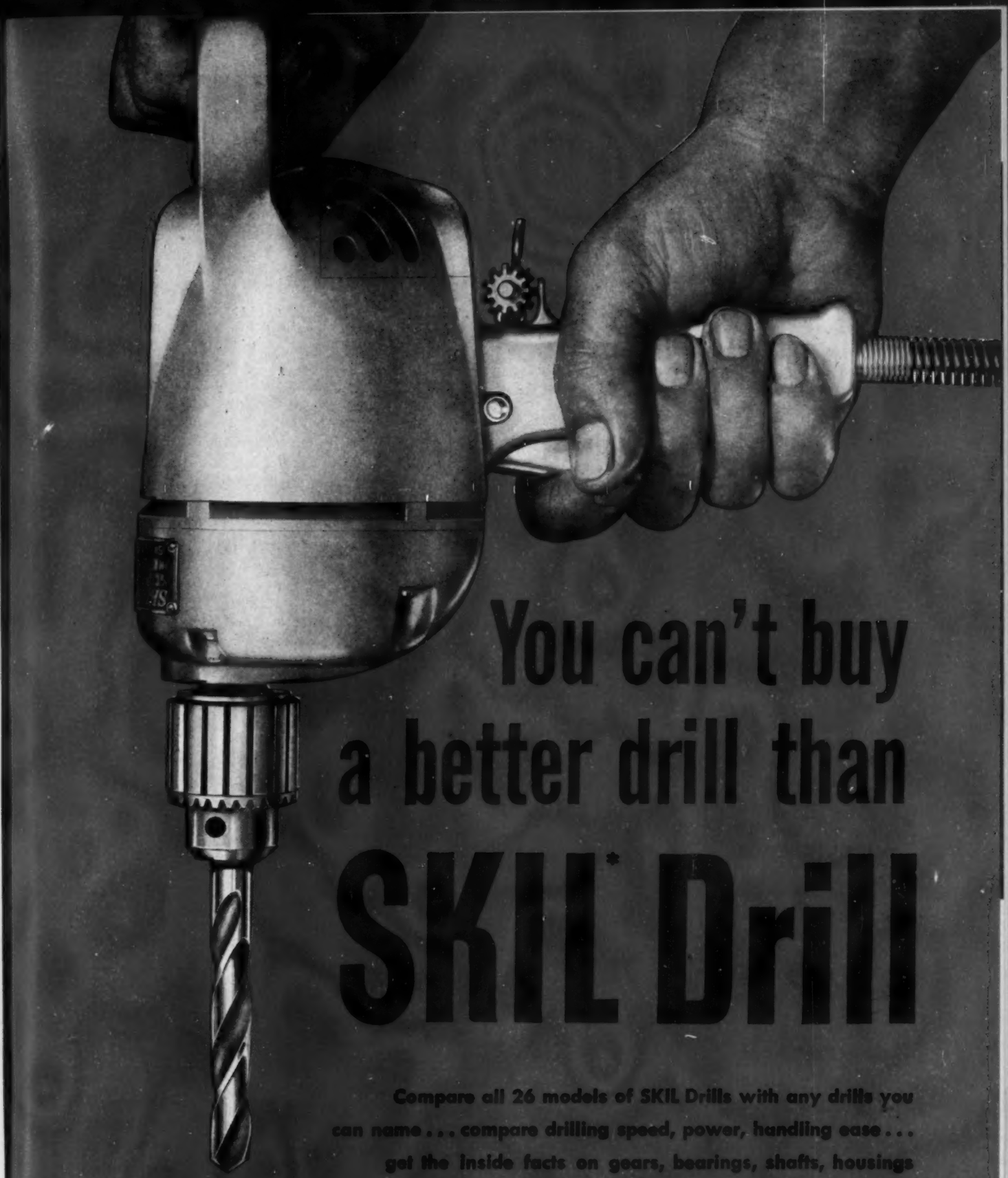

You can't buy a better drill than SKIL* Drill

Compare all 26 models of SKIL Drills with any drills you can name . . . compare drilling speed, power, handling ease . . . get the inside facts on gears, bearings, shafts, housings . . . then you'll know why more buyers are buying more SKIL Drills everyday. Your SKIL Tool Distributor is ready to show you that you can't buy a better drill than a SKIL Drill. Call him today.

*SKIL Drills are made only by SKILSAW, INC.

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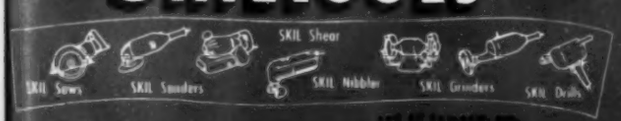

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GET POSITIVE LOCKING ACTION with MAC-IT HOLLOW LOCK SCREWS!

Mac-it Hollow Lock Screws provide a locking arrangement that combines convenience with positive locking action. They lock as effectively after many thousand adjustments as they do the first time. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

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MULTI-DRILL
for Production Drilling

9" DRILLING AREA —AVAILABLE WITH 2 TO 8 SPINDLES

- Designed for accurate, high speed production drilling
- RUGGED CONSTRUCTION
- Quick, easy adjustments to **any** hole pattern on or within a 9" circle; ½" minimum center distances; Drill sizes 1/32" to 3/8"
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Model 900
Locater arms are designed for fast, easy adjustment
—FITS ANY DRILL PRESS
Dependable Performance ... proven by industry

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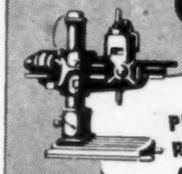
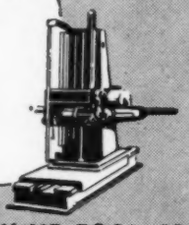


PRODUCTION SPEEDING RADIAL DRILLS AND HORIZONTAL DRILLING, BORING AND MILLING MACHINES



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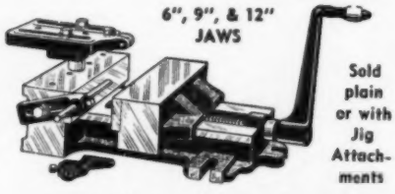
THE CINCINNATI GILBERT MACHINE TOOL CO.
CINCINNATI, OHIO



BASIC UNIT for repeat-operation positioning of work

GRAHAM MULTI-PURPOSE VISE

Use this flush, parallel, square vise to form the central basic holding unit for production operations on miller, planer, shaper, drill press, radical, grinder. We provide stops, guides, V & shell jaws, bushing plates, etc., giving you ready-made jig or fixture at great savings. Sizes up to 124 lbs.

Request Illustrated Price Bulletin No. 41

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Look to MODERN for accurate, fast, economical thread cutting

Hardened and ground throughout

Wider threading range

Made with least number of parts

Cut close-to-shoulder threads without special chasers

Easily adjusted for thread size

Greater flexibility

Quick and easy chaser change

MODERN

STATIONARY TYPE SELF-OPENING

DIE HEADS

Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

Modern Self-Opening Die Heads thread diameters from 1/8" to 7" in standard heads, and up to 14" in special heads . . . accurately, fast, and economically. They are adapted to practically every thread cutting operation within their capacity. Designed for use in hand screw machines, turret lathes, and other machines where the die heads are used in a stationary position.

For complete information, write for Bulletin No. M-123

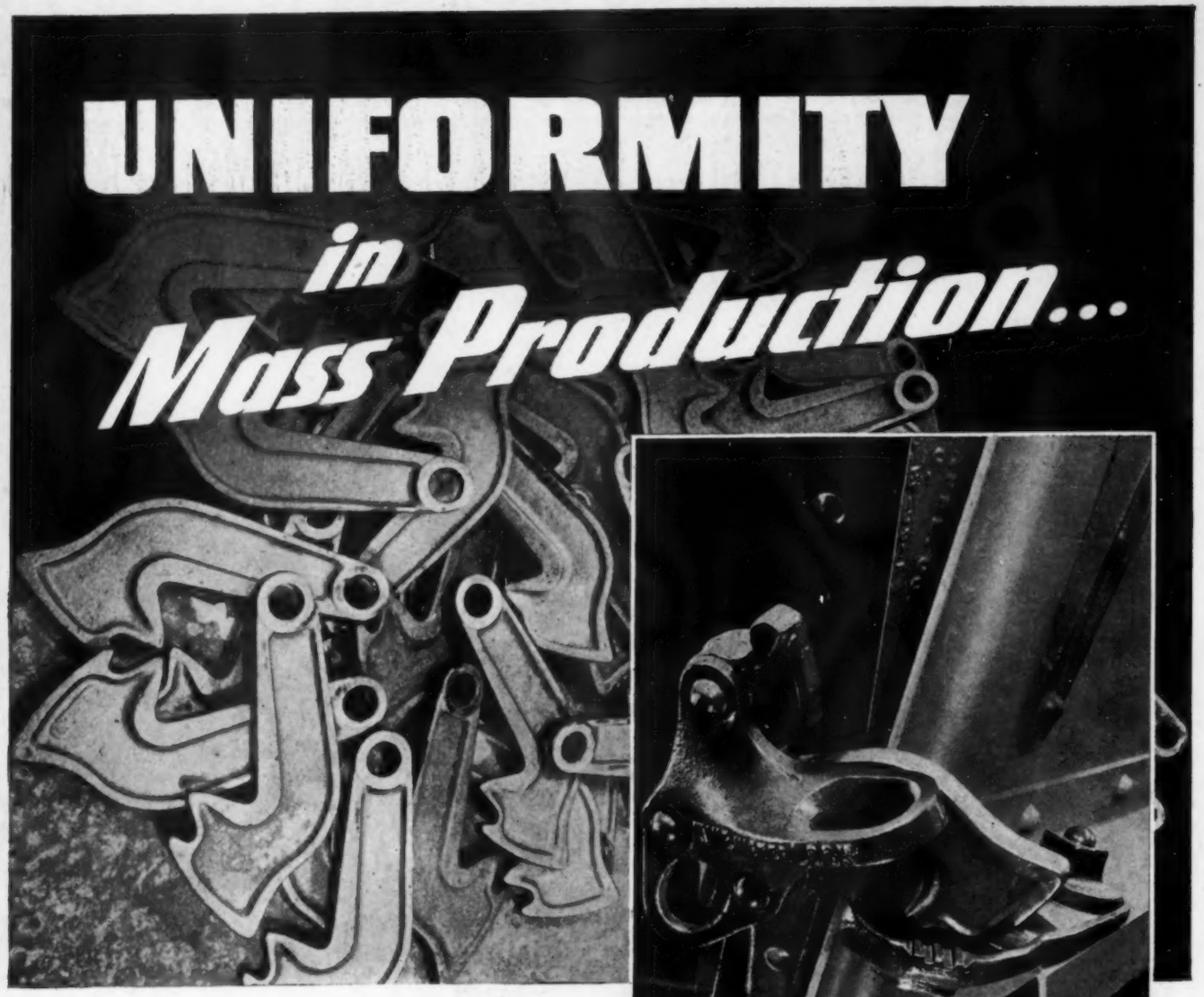
MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

UNIFORMITY *in Mass Production...*



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Whether it's the first, tenth or ten thousandth steel casting, Unitcast's modern equipment coordinated by technical "know-how" results in Unitcastings consistently uniform and at the lowest possible cost. They all adhere to the strictest specifications—uniform in size, uniform in weight, uniform in physical properties.

As an example of Unitcast's consistent uniformity, the illustrated door latch for a railway specialties manufacturer has been mass produced until now the total runs well over 1,500,000!

Consult with Unitcast Engineers about the advantages of *uniform* mass production for your steel casting problems. Unitcast Corporation, Toledo 9, Ohio.

UNITCAST CORPORATION

ALLOY AND CARBON ELECTRIC STEEL CASTINGS

Delta 17" Drill Press (for metal, wood, or plastics)
Delta Abrasive Disk Finishing Machine
Delta Super-Hi* Drill Press
Delta 14" Metal-Cutting Band Saw (metal-cutting and wood-cutting)
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Bulletin A-14-3 pictures and describes Delta Super-Hi* Drill Presses, for small-hole work from .025" dia. to ¼".

Bulletin A-17 pictures and describes Delta 17-inch Drill Presses.

Bulletin A-20 pictures and describes Delta Cut-Off Machines.

Bulletin A-23 pictures and describes Delta Toolmaker* Surface Grinder, Chip-Breaker Grinder, Tool and Cutter Grinder.

Bulletin A-28 pictures and describes the Delta 14-inch Metal-Cutting Band Saw.

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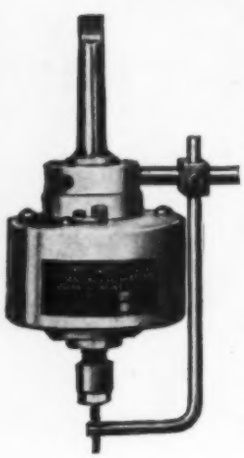

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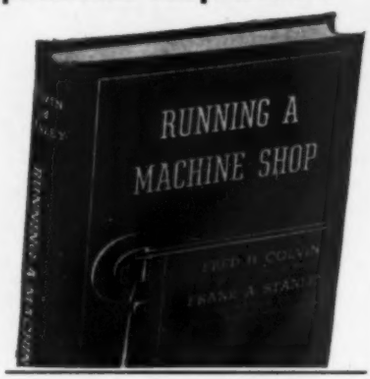

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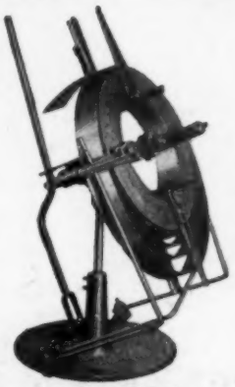

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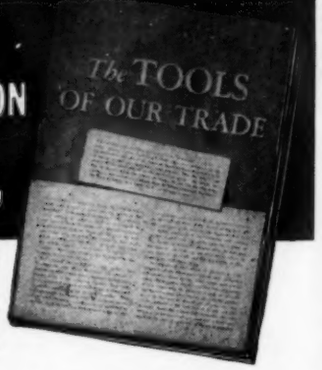

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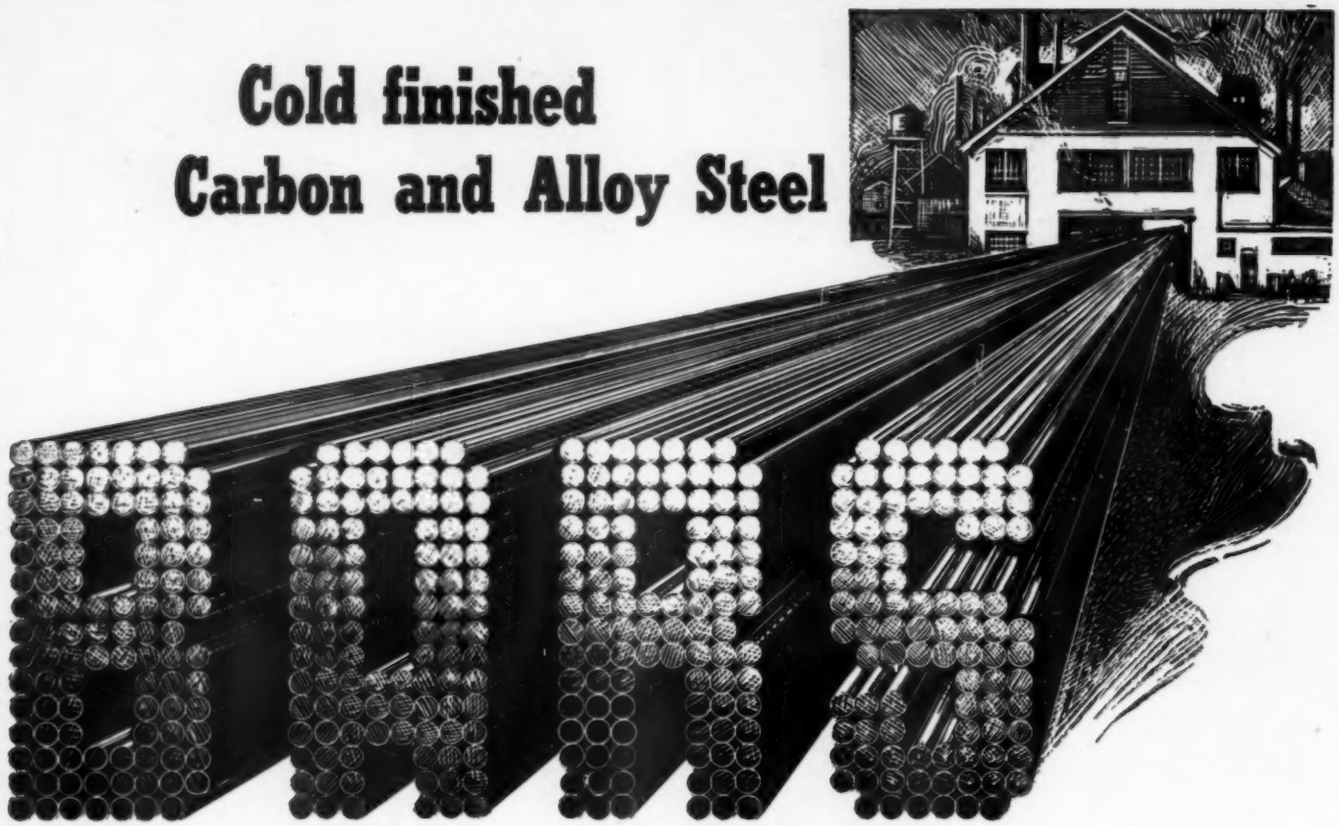

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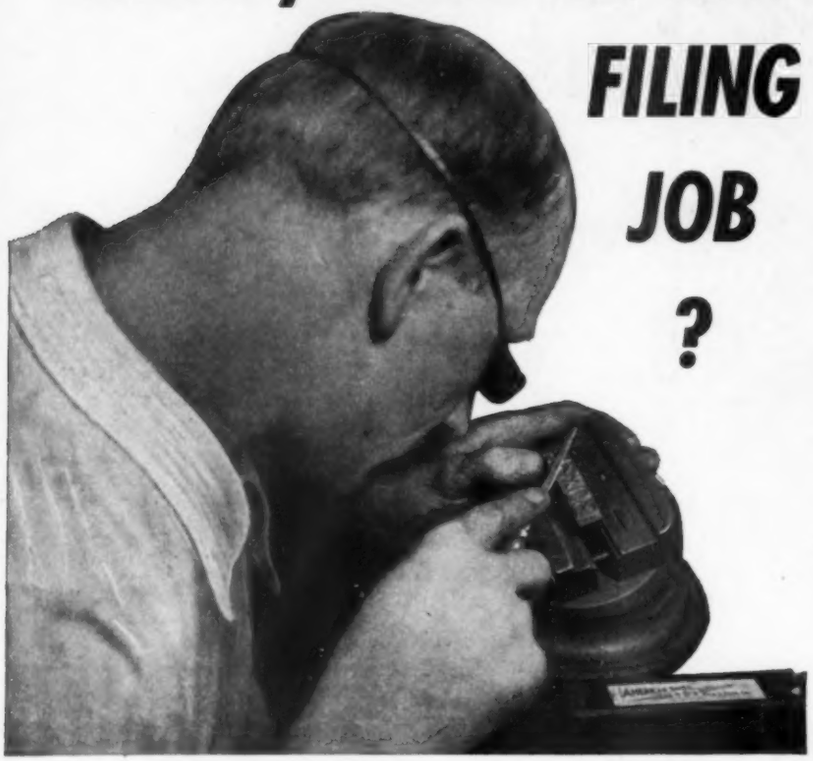

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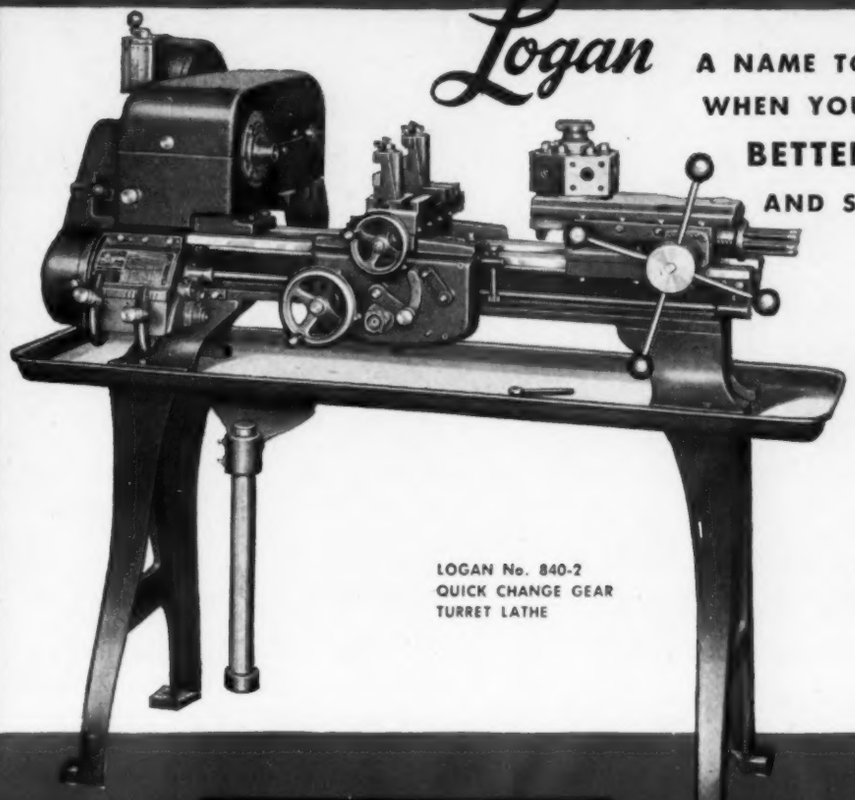

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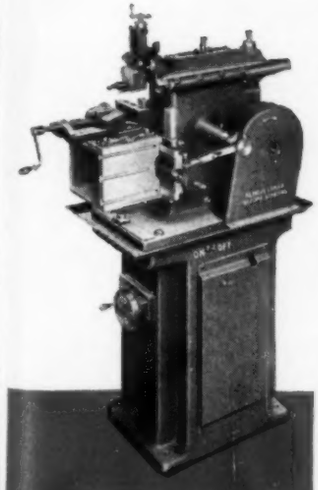

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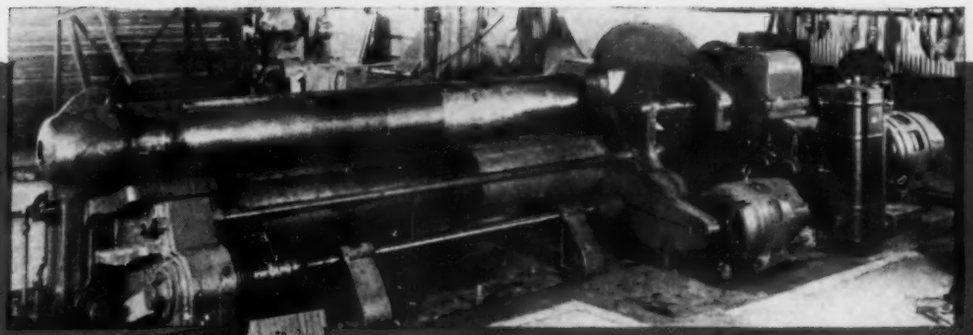

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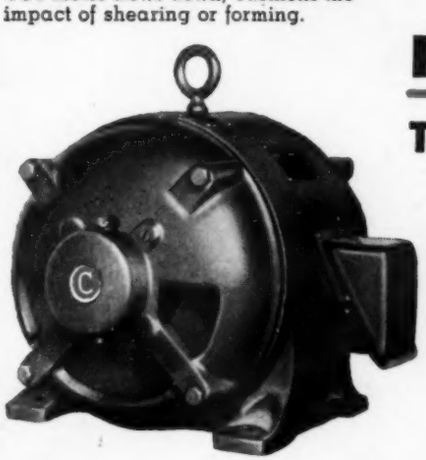
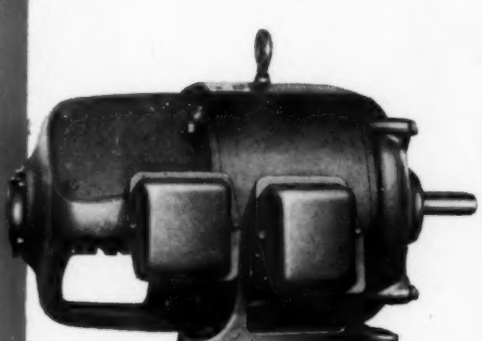
Cushions High Impact Loads — Century 40 horsepower SCT motor slows down, cushions the impact of shearing or forming.





Select the

Right CENTURY MOTOR

To Provide Carefree Performance —Continuous Production

The three applications shown here are typical of the many types of machines for which Century motors supply dependable power—day after day.

Regardless of the load requirements or surrounding atmospheric hazards, there is a correct Century motor that will keep your machines on the job.

Throughout their wide range of types and sizes Century motors are ruggedly built. Rigid frames, accurately machined feet, large shafts, accurate alignments, adequate ventilation system and good mechanical and electrical balance—all contribute to their outstanding performance.

Century Splash Proof, Totally Enclosed Fan Cooled and Explosion Proof frames protect your production against shutdowns caused by hazardous atmospheres.

Century motors are built in a wide range of types in sizes from 1/6 to 400 horsepower to provide top performance to meet every electric power application.

Specify Century motors for all your electric power requirements.

Century C MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri

563

Offices and Stock Points in Principal Cities

5 COMPARATORS IN ONE!

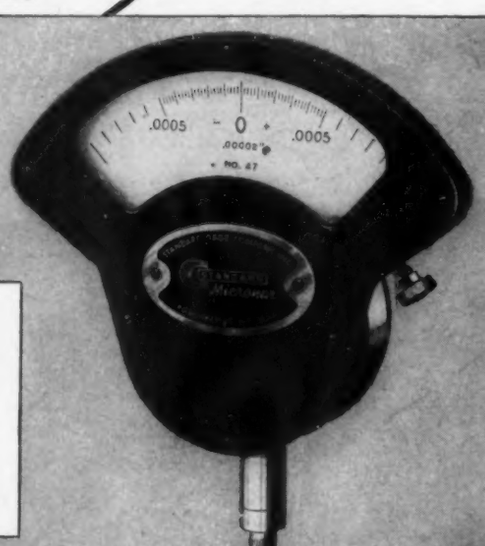
A Simple, Rigid, Reliable Instrument With Many Uses

(Model 108)

Any #2 or #3 Size AGD Indicator With Standard Type Back May Be Used — Also the

- Contact Pressure Can Be Regulated
- Entirely Self-Contained
- Anvils Rigidly Mounted On Heavy Base
- Fine Adjustment Easily Made With Wing Handle

NEW STANDARD *Micronar* INDICATOR



A high amplification, high accuracy instrument, ideal for use on this Comparator.

ENGLISH MODEL	GRADUATED .00002" (CENTER SECTION)	RANGE .0018"
METRIC MODEL	GRADUATED .001 mm.	RANGE .04 mm.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

A WORLD STANDARD FOR PRECISION

CUSHMAN

POWER CHUCKS

WRITE FOR CATALOG PO-62

THE CUSHMAN CHUCK COMPANY
HARTFORD, CONNECTICUT

ANY WAY YOU LOOK AT IT . . . FEDERAL NOARK Motor Starters cut maintenance costs!

CONTACT RENEWAL . . .
as easy as signing your name!

Renewing the solid silver contacts in a Federal NOARK Motor Starter takes no time at all! No need for tools of any kind! Simply press one end of the contact down, and it slides out of its groove without effort. Slide in a new contact to finish the job. (And, once it's in it stays in — vibration can't loosen it out!)

- Simplified RESPONSIVE ELEMENT
- Frictionless SOLENOID ACTION
- Instant COIL REPLACEMENT

Where maintenance means money . . .

Save with

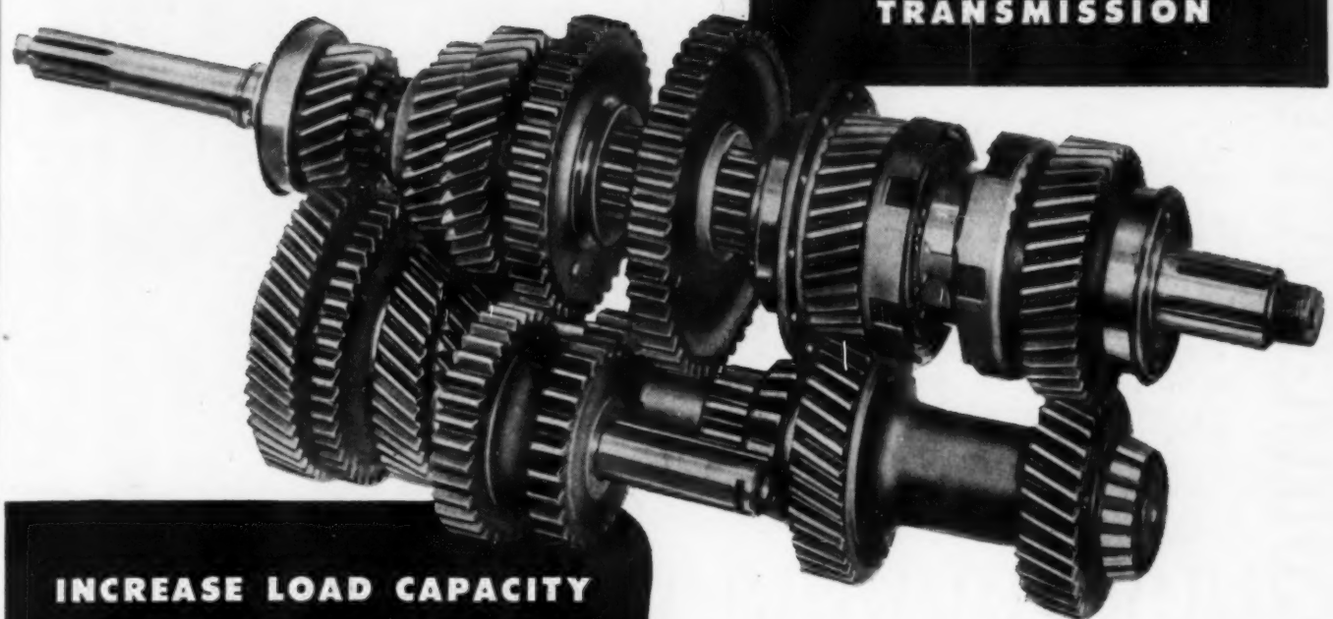
Federal NOARK Motor Starters

Federal Electric Products Company, Manufacturers of a Complete Line of Electrical Products, including Motor Controls • Safety Switches • Service Equipment • Circuit Breakers • Panelboards • Switchboards • Bus Duct

Executive Offices: 50 Paris Street, Newark 5, N. J.
Plants: Hartford, Conn., Newark, N. J., St. Louis, Mo., L. I. City, N. Y.

Take a Tip on Gears

...from this new Mack 10-SPEED TRANSMISSION



INCREASE LOAD CAPACITY
RAISE IMPACT STRENGTH
ADD WEAR-RESISTANCE

...with Nickel Alloy Steels

These gears demonstrate basic advantages secured by using Nickel alloy steels . . .

Steels that not only provide increased resistance to shock and high tooth pressure . . . but, in addition, are readily machinable and respond to heat treatment with minimum distortion.

Pinions, gears and shafts of the Nickel-molybdenum steels used in this transmission provide exceptionally hard carburized surfaces over strong, tough cores.

Types 4620 and 4820 steels are supplemented by the use of 4320 Nickel-chromium-molybdenum steel for some parts.

High load carrying capacity, and the consistently long, dependable performance of Nickel alloy steels in heavy-duty service, make their economy self-evident. Improve your products or equipment by specifying vital parts in Nickel alloy steels.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, copper-base and other alloys containing Nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Goss & DeLeeuw

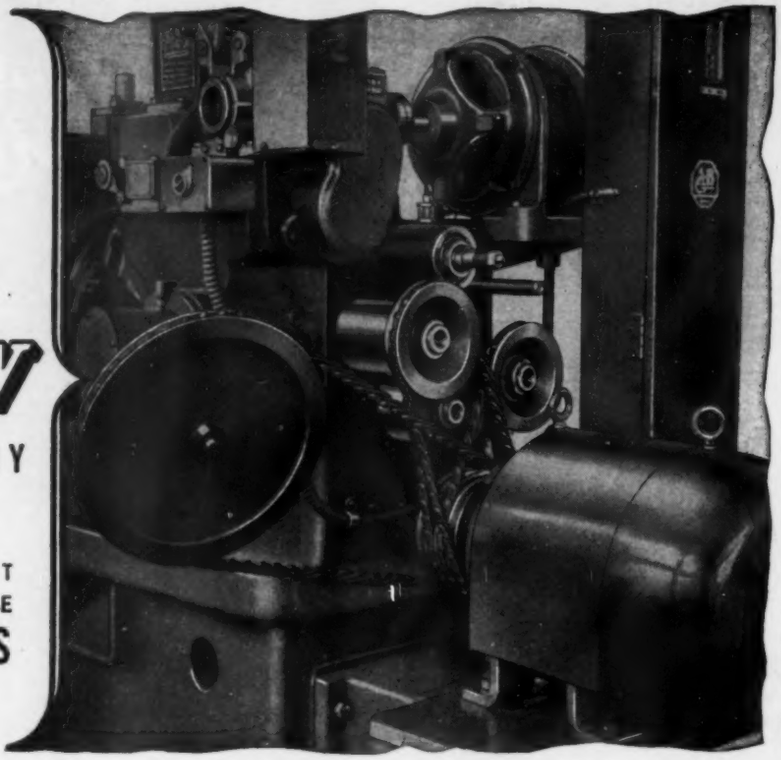
MACHINE COMPANY

KENSINGTON · CONN.

★

THE WORLD'S FINEST MULTIPLE SPINDLE

CHUCKING MACHINES



CATSKILL

ABRASIVE CUT-OFF MACHINES

Cut FASTER, SMOOTHER, STRAIGHTER

Cut wide range of bars, blanks, tubes, pipe, shapes, speedily and accurately. Precise, clean cutting that needs no secondary finishing operations.

WRITE FOR FOLDERS

Mfd. by Catskill Metal Works, Inc. Catskill, N. Y.

SOLD EXCLUSIVELY THROUGH THE

DOALL COMPANY

Desplaines, Ill. *Branches in All Principal Cities*

Sensitive DRILLING MACHINES Avey

CINCINNATI OHIO

BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

DIAMONDS FOR WHEEL DRESSING TOOLS

DIAMONDS FOR THREAD GRINDING TOOLS

DIAMONDS FOR ALL INDUSTRIAL PURPOSES

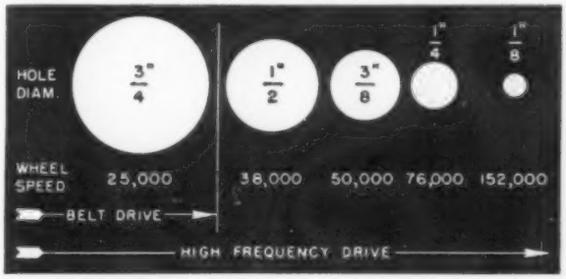
KOEBEL

Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13

What's in VERMONT *this month?*

NEW WHEELHEAD REDUCES COST OF FINISHING SMALL HOLES. Surface speeds of 5,000 to 6,000 feet per minute are required to grind metal efficiently with present grinding wheels. To grind a hole ¾-inch in diameter, a 3/16-inch wheel is used. To maintain efficient grinding speed this wheel must rotate at 30,000 R.P.M. This is about the maximum speed of a belt-driven spindle. But, to grind a ½-inch hole, a ⅜-inch wheel must turn at 50,000 R.P.M. The surface speed at maximum belt drive R.P.M. is only 3,000 feet per minute, or one half the required speed. Grinding efficiency is lost; wheel cost is high; production time is high. If the spindle is run over 30,000 R.P.M., a new belt is needed once a day in some cases.

The Bryant Chucking Grinder Company in Springfield, Vermont, has developed a precision ball bearing wheelhead with a built-in high-frequency electric motor. This wheelhead, having no belt, will run up to 100,000 R.P.M. It is designed for long life and high efficiency. Mist lubricated, preloaded ball bearings and a water cooled jacket assure continuous operation. Efficient grinding speeds are provided for hole sizes far below the present ¾-inch diameter; maximum wheel life is assured; belt costs are eliminated and "down time" is held to a minimum.



This is an example of how new developments in machine design can offset expenses in maintenance and perishable tools, and, at the same time, increase production.

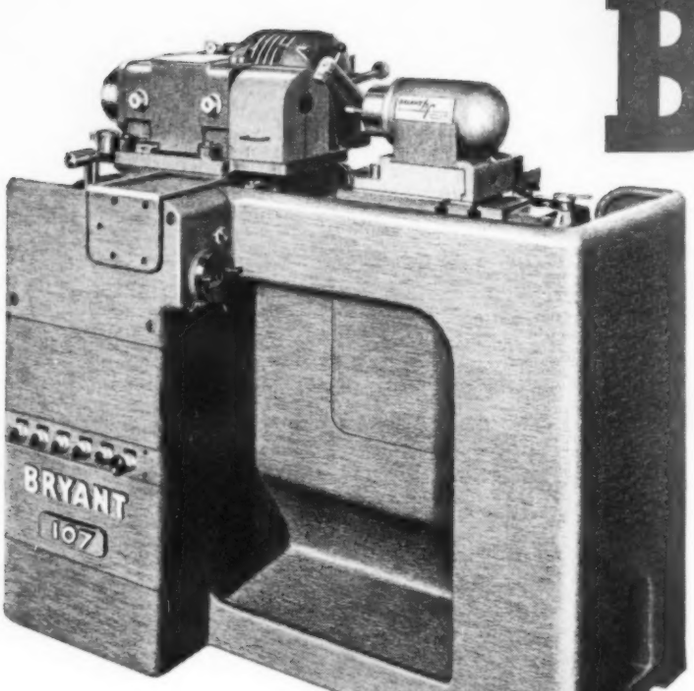
It won't cost to inquire.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

BRYANT

Number 107

INTERNAL GRINDER



The No. 107, with Bryant Hi-Frequency Wheelhead, is the smallest internal grinder in the Bryant line. Other Bryant equipment will grind holes through the complete range up to 60-inch diameter swing. Write to the factory for full information.

SPECIFICATIONS

Total swing	9 inches
Will grind bore diameters	⅛ to 3 inches
Maximum traverse	6 inches
Maximum hole depth	4 inches
Will grind included angle	90°
R.P.M. of work spindle	200 to 2,400 R.P.M.
Net weight	2,500 lbs.
Floor space — 60 inches x 50 inches (with coolant tank)	

SLIDES
Preloaded ball slides for both cross and longitudinal motion.

WORKHEAD
Ball bearing spindle, variable speed electric drive, 200 to 2,400 R.P.M.

WHEELHEAD
Ball bearing, speeds up to 100,000 R.P.M.

TRAVERSE
Mechanical, powered by variable speed electric motor.

CROSS FEED
Powered by variable speed electric motor.

POWER
Standard A.C. current.

You can *"See the Difference"* with a BRYANT GAGE

NEW BRYANT 3-FLUTE TAP GAGE quickly determines lead, thread form and size of thread that tap will cut. Large dial indicator calibrated in "tenths." Can be used for inspecting 3-flute taps with or without radial relief and for threaded parts of the same diameter and pitch. Write for details.

It is no longer necessary to "feel for fit" with plug and ring gages when inspecting threads. The Bryant Thread Gage shows, on a dial indicator, whether a thread will assemble properly with its component.

At a glance, anyone can compare threaded parts with a master and tell the whole story immediately — size, presence of burrs, out-of-roundness, accumulated inaccuracies of pitch, lead, diameter and thread form.

It's fast too. The design incorporates three thread segments, two stationary and one movable. The segments are operated by a thumb lever — the part is dropped between the segments — the lever is released, causing immediate contact of segments to threads — a one third turn of the part inspects it all over.

Send samples or drawings for a complete story on how Bryant can save inspection money for you.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

CONTRACT WORK

SCREW MACHINE SPECIALISTS

- 1/32" to 1⅝" Dia. Cap.
- Brown & Sharpe Automatics Acme-Gridley Mutiple Spindle Automatics
- Hand Screw Machines
- Equipped for All Secondary Operations
- Send Prints or Samples for Prompt Quotations

C. H. HOPPER MACHINE CO.
1935 UNION RD.
GARDENVILLE, N. Y.

CONTRACT WORK WANTED

Parts or complete assemblies manufactured according to blueprints.

Open time on the following machines.

- Automatic Production Milling Machines 10" cap.
- Drill Spindles to 20" cap.
- Engine Lathes to 18" cap.
- Production Lathes for turning irregular contours. Back facing attachments. 9 by 20
- Profiles 8" cap.
- Surface and Cylindrical Grinding

Also available source of Gray Iron, Forgings and Non-Ferrous Castings.

Inquiries Invited

OXFORD PRODUCTS COMPANY, INC.
OXFORD, NEW YORK

ALMA WANTS YOUR BUSINESS

- Job Machining
- Production Machining
- Automatic Screw Machining
- Heat Treating—Welding
- Tools—Jigs—Fixtures—Gages
- Special Machinery
- Designing—Engineering
- Parts—Made to Order in Volume
- Products Wanted—To Manufacture
- Accurate Work—Prompt Delivery

CONFIDENTIAL HANDLING OF ALL INQUIRIES

ALMA MOTOR COMPANY
OFFICE: 1434 NATIONAL BANK BLDG.
DETROIT 26, MICHIGAN
Telephone: Woodward 5-0643

SCREW MACHINE PRODUCTS

Multi Spindle ¼" to 2⅝" Diameter. Punch Presses to 50 Ton. Turret and Engine Lathes. All secondary operations. Drill Press, Riveting & Soldering, Packaging & Assembling.
Send us your prints or samples for quotations.

METOMIC CORP.
2944 W. 26th St., Chicago 23, Ill., Bishop 2133

Put Your Idle Capacity to Work

profitable business today outside their regular lines. Hundreds of metal-working companies are finding Tell metal-working America—the 100,000 readers of **American Machinist**—about your facilities. Write for rates.

CONTRACT WORK DEPARTMENT
AMERICAN MACHINIST
330 W. 42nd St., N. Y. 18, N. Y.

THREAD GRINDING

Accurate Lead *Send Print*

Universal Thread Grinding Co.
579 Lafayette St., Bridgeport, Conn.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.

GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATES
(Not available for equipment advertising)

60¢ per line, minimum 4 lines. To figure advance payment count 5 average words as a line.
POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.
PROPOSALS, 60 cents a line an insertion.

INFORMATION

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 1 line additional in undisplayed ads.
DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A.M.

NEW ADVERTISING received by 1 A. M. January 13th will appear in the issue of January 29th subject to limitation of space available

WANTED

Machine tool designers for layout work by leading machine tool manufacturer in moderate-size Ohio City.

Good educational background with 5 years mechanical design experience required.

Knowledge of Hydraulic and electric circuits desirable. Replies held in strict confidence.

P-3421, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED
ASS'T PRODUCTION SUPT.

Man with mechanical engineering background for position as assistant production superintendant for a job shop manufacturer of precision machinery. Heavy manufacturing experience desirable. Must know all phases of production and operation of machine tools. Age preference between 35 and 45. Salary commensurate with ability. Plant located in an aggressive north central Wisconsin community of 35,000 population.

All replies confidential

P-3384, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

DESIGNING ENGINEER wanted capable of designing ball bearing, high speed, electrical driven woodworking machinery. Newman Machine Company, Inc., Greensboro, North Carolina.

SELLING OPPORTUNITIES OFFERED

MFR. OF Air-Hydraulic Press seeks aggressive sales representatives who now handle kindred lines. No other press does so many jobs so well! Advantageously priced, well advertised, good repeater. Liberal commission. Exclusive territory available. Please give full particulars. Write RW-3415, American Machinist.

CUTTING TOOL Salesmen. New type end mill. Sells easily all shops. Must have allied lines. Excellent territories open. SW-3445, American Machinist.

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500 and up. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (38 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Particulars on request. R. W. Bixby Inc., 266

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 246

DEVELOPMENT ENGINEER WANTED

Excellent opportunity for a man trained and experienced in process, research and development engineering, materials handling and plant layout with manufacturer of nationally distributed consumer products located in small central Ohio community. Apply by letter giving all details as to education, experience, references and salary expected, including recent photograph. Replies will be confidential.

P-3457, AMERICAN MACHINIST
520 N. Michigan Ave.
Chicago 11, Illinois

WANTED—FOREMAN for Machine Shop in Northeastern Ohio City. Must have highest qualifications. Write, c/o American Machinist, 330 W. 42nd St., New York, giving full details as to experience, training, salary expected, etc.

P-3411, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

MACHINE TOOL EXECUTIVE

To manage Machinery Manufacturing Plant.

P-3456, AMERICAN MACHINIST
520 N. MICHIGAN AVE., CHICAGO, ILL.

RESUMES THAT GET JOBS

Executive, Technical, Industrial

Your experience record developed into a comprehensive, job-winning resume *by mail.*
Write for details.

PERSONNEL COUNSEL SERVICE
366 Madison Ave., New York 17, N. Y.

POSITIONS WANTED

GEAR AND Production engineer, 12 years' experience in gear engineering, tooling processing and misc. production of jobbing, machine parts. PW-2185, American Machinist.

MECHANICAL ENGINEER with record of accomplishment in carrying projects to profitable conclusion desires connection with live wire concern. Broad experience in development and manufacture of products. Practical experience in shop, foundry, etc. Inventive mind but not a dreamer. Age 47. Currently chief engineer medium concern. PW-3408, American Machinist.

BUSINESS OPPORTUNITY

Established Engineering

and Contact Photo-Reproduction Service Company for sale or consider incorporating. Located in the heart of 400 manufacturers, no competitor in local area. Excellent opportunity for ambitious Engineer (s). Please write BO-3446, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys. Suite 453, 815-15th Street, N. W. Washington 5, D. C.

SALES EXECUTIVE AVAILABLE
TWENTY YEARS EXPERIENCE

Proven ability energetic 42 year old Machine Tool Sales and Advertising Executive seeks new opportunity with well rated progressive Production Machine Tool or Accessory Manufacturer. Experienced both Direct Selling and Dealer Type Representation.

PW-3255, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL PROPERTIES
SPACE
any size
any type
any where

A few selections from our extensive listings:

- **LEASE IN LONG ISLAND CITY**
  12,000 s.f. Storage Space, Enclosed 60x200, brick partition, large doors, waterfront. AR File 549Y—Walter C. Smith
- **BUY IN RHODE ISLAND**
  300,000 s.f. factories priced at $2. per s.f.
  AR File B-1Pa2L—Walter C. Smith
- **BUY—Possession 1950**
  450,000 s.f. Modern Bldgs. Reinforced Concrete. 12 car R.R. sdg. 21 trk platform; spklrd. in HUDSON COUNTY, N. J.
  AR File 203J—Walter C. Smith
- **RENT—20 mins. from N.Y.**
  18,000 and 40,000 s.f. Fine Indus. Loft Space Newark (NJ) area
  Only 70¢ s.f., live steam available.
  AR File #177J Robert A. Segal
- **RENT just 50¢ s.f.**
  Newark (NJ) area
  56,000 and 58,000 s.f. floors in modern concrete factory bldgs. heat, spklr. Live steam avail.
  AR File 173J—Alan G. Mayer
- **Lease or Buy at ROCHESTER, N.Y.**
  In the Heart of the City over 300,000 s.f. in units of floors, bldgs. or plants from 5,000 sq. ft. up. RR siding, spklr, heat furnished by Roch. Gas & Elec. Three street frontages; river frontage. This property surrounded by nationally known mfg. cos. LOW RENTAL RATES
  Ask for Circular #128.

- **RENT for $21,500 a year**
  35,000 s.f. Brick & Concr. 1 & 2 story bldgs. 20,000 sf yard space; RR sdg. for 5 cars, spklr, proc. steam; 510 ft. truck loadg. platform. North Jersey Location
  AR File 167J—Walter C. Smith
- **Lease in a Selected NORTH JERSEY Community**
  Units: Floors of 13M, 14M, 20M 25M, square feet
  Buildings of 22M, 69M, 103M, 124M, 164M, 346M, 520M s.f. Modern, fireproof, with RR Siding, spklr, heat, watchman Available, high press steam and air conditioning
  ONE BEAUTIFUL FLOOR 480'x960' with bays 40x60 and unlimited load.
  Ask for special Brochure #127
- **BUY—at York, Pa.**
  MARTIN-PARRY CORPORATION (Asset Realization Co., exclusive agents) Offer FOR SALE.
  a. INDUSTRIAL PLANT 236,231 s.f.
  b. Vacant Plot over 3 acres 879' RR Siding
  c. Hotel-Inn

Special Brochure now in prep.

ACTION! IN REAL ESTATE
Asset Realization co.
14 CHURCH ST., NEW YORK 6, N. Y.
790 BROAD ST., NEWARK 2, N.J.

MANUFACTURER'S REPRESENTATIVE IN PITTSBURGH DISTRICT

Wishes additional machine tool lines and allied accessories. 15 years industrial sales experience in this territory. Will also consider bar steel and sheet steel accounts.

RA-3485, AMERICAN MACHINIST
330 West 42 Street, New York 18, N. Y.

WILL TRADE

Have a number of 1" 6 spindle type RA *National Acme Automatics* like new *will trade for following;* 36" Van Norman *milling machine, Do all Saw,* 42" *Bullard,* 2A Warner & Swasey, #4 *milling machine, horizontal boring machine*—must be in good condition as our automatics.

NYLEN PRODUCTS COMPANY
ST. JOSEPH, MICHIGAN

"SEARCHLIGHT" IS
Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It
For Every Business Want
"Think SEARCHLIGHT FIRST"

WANTED

WANTED

GEAR HOBBER

In good condition; 16 to 18 inch blank O.D. capacity. State full particulars in first letter.

MACOMSON MACHINE CO.
Box 1400 **Shelby, N. C.**
Phone 313-R

WANTED
OVERHEAD CRANE

7½ ton Overhead Traveling Crane adaptable to 71'-4½" span, 25 ft. lift, 4'-10" truss clearance, 440 V., 3 Ph., 60 Cy. current. Must be less than ten years old. Equivalent to P. & H. or Northern cranes.

REVERE COPPER AND BRASS INCORPORATED
Michigan Division, Detroit 9, Michigan

WANTED

Bullard Vertical Turret Lathe 42" Spiral Drive—Prefer Serial No. above 22,000.

WESTBROOK ELEVATOR MFG. CO.
Danville, Va.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

AUTOMATICS

#0 & #00 Brown & Sharpe Full Automatic, Standard Speed

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle & Equip.

1—#515 National Acme 9/16" 4-spindle automatics, complete with equip.

ENGINE LATHES

32"x28' Bridgeford, Geared Head
32"x16' Bridgeford, Geared Head
28"x10' Davis, Quick Change Gear
26"x18' Bridgeford Geared Head
24"x36' New Haven, Motor Drive
24"x22' Lodge & Shipley, Geared Head
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G.
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Lodge & Shipley geared head
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Drive
16"x6' Lodge & Shipley Geared Head
14x8' Rockford, Q.C.G. Collets
14"x8' Pratt & Whitney, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' American, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x3' Craftsman, Bench, M. Drive
11"x4' Sidney, Q.C.G. Floor Type
11"x3' South Bend, Q.C.G. M. Drive
10"x24" Logan, Q.C.G. (new) in stock
9"x12" Sundstrand Mfg. Type
8"x18" Rivett Precision, Bench
9"x15" Porter-Cable, Production

TURRET LATHES

Morey #2 Geared Head, 1" Cap. M. Dr.
Simmons, Microspeed, 1" Cap. M. Dr.
W-Swasey, Univ. #4, 1½" Cap. M. Dr.
Gisholt #4, Univ. 2" Cap. M. Dr.
W-Swasey #2A, Univ. 2½" Cap.
Gisholt #5, Univ. 2½" Cap.
W-Swasey #3A, Univ. 3½" Cap.
Bullard 42" Vert. Turret M. Dr.

GRINDERS

#2 Cinci. Univ. Tool & Cutter
#1 B&S, 10x24, Univ. Cylindrical
"A" Norton, 10x18 Cylindrical
"A" Norton, 10x72 Cylindrical
"A" Norton, 10x84 Cylindrical
#2 Norton, 10x32 Univ. Tool & Cutter
#11 B&S 10x30 Cylindrical
#10 B&S 6x18 Cylindrical
#4 B&S Univ. 12x60 Cylindrical
#12 Greenfield, Internal Hydromatic
#70 Heald, Internal, Grinds 11" deep
#2 Cinci. 6x36 Univ. Cylindrical
#2 Cinci. Centerless, Motor Dr.
#51 Oliver, Drill Pointers, 1½" cap.
24" Blount Wet Grinder
Besley Dble. End Disc, 30" Discs
#2 B&S Automatic 6x18 Surface
96" Seybold, Knife Grinder
Blanchard #16 Vertical, M. Dr.
Gorton Dble. End, 18" Discs
Pratt-Whitney 14x36 Vert. Surface
Abrasive #33 Vert. Surface, Automatic
#2 B&S Face Grinder, M. Drive

SHEARS & METAL WORKING

Cerweco, 8'x12 ga. Brake
Wais & Roos, 10½'x¼" Gap Shear
Lown, 6'x16 ga. Slip Rolls, M. Dr.
Lennox Splitting Shear, ¾" Cap.
Lennox Bevel Shear, ¼" Cap. M. Dr.
Peckstow, Power Seaming Machine
Racine 6x6 Shear-Cut Hack Saw

MILLING MACHINES

Cinci. 18" Mfg. Mill, Motor driven
Knight #1½ Vert. Mill. Univ. Table
Douglas #0 Horiz. Mill Rect. Overarm
#3 Cinci. Vertical, Dial Type
#1M Kent-Owens, Horiz. Mill
#1½B Milwaukee, Dble. Overarm
#2B Milwaukee, Dble. Overarm
#3B Milwaukee, Dble. Overarm
#2B Milwaukee, Univ. Horiz.
#2 Cincin. Univ. Horiz.
#2 Van Norman, Duplex Mill
#4 Cinci. Vert. High Power
#2 Kempsmith, Horiz. Plain
#1 Kempsmith, Horiz. Plain
#5C Becker Vertical Mill
#3, #4, #5 Cinci. Horiz. Mills
#31 Lucas, Horiz. Boring, 3" Bar
#0 Giddings & Lewis, Horiz. Boring Mill—3" Bar, Motor Drive

DRILLING MACHINES

Natco #12, 20 Spdles. 3/16" Cap.
Natco #D6, 24 Sples. 5/16" Cap.
Natco #D5; 14 Spdles. 5/16" Cap.
Natco #D6, 24 Spdles. 5/16" Cap.
Minster #2D, Sgle. Spdle. Upright, compound table, #5 m.t. Heavy Duty
Cinci-Bickford, 3½' arm, 9" col. Radial
Cinci-Bickford, 4' arm, 11" col. Radial
Cinci-Bickford, 5' arm, 13" col. Radial
Fosdick, 5' arm, 14" col. Radial, M. Drive
Cinci-Bickford, 6' arm, 15" col. Radial

SHAPERS & PLANERS

Pratt-Whitney Vert. Shaper, 6", M. Dr.
Logan 7" Horiz. Shaper, Motor Drive
Machinery Sales 16" Crank Shaper
Gould & Eberhardt 24" Crank Shaper
Gould & Eberhardt 16" Crank Shaper
American 24" Crank Shaper
New Haven 12" Vertical Shaper
Whitcombe, 24x24x6 Planer
Niles-B-P, Shaper-Planer, 20x20x24
Steptoe 16" B.G. Shaper, M. Drive
Betts, 120x72"x35' Planer
Ingersoll Planer Type Mill, 30x30x12

POWER PRESSES

Standard #1 "A", 6 tons, floor type
Bliss #68C Double Action Press
Hilles & Jones #4 Single End Punch & Shear, 48" Throat, equipped as Plate Shear with 18" Blades, Cap.—1¼" thru 1" arranged motor drive
Bliss #76½B, Single Crank Geared Press, 7" Shaft, 3" Stroke, Motor Drive
Horton-Ackerly, 6 tons Bench Presses
Caldwell, 200 Tons, Hydraulic, Horizontal Wheel Press, 36" Dia. Cap.
Lucas 15 Tons, Power Arbor Press, M. Dr.
Bliss-Consolidated #163B, S.S. Dble. Crank Press—Bed 42"x24", Motor Drive
Clearing 200 Tons, S.S. 10" Stroke, M. Dr.
Federal #5 O.B.I. 49 Tons, M. Dr., 5" Str.
Michigan O.B.I. 36 Tons Cap., 2" Stroke
General 8 Tons, Flexible Power Press, M. Dr.
Ferracute #EG52 Geared Coining Press, 150 Tons Cap., up moving ram
Baxendale O.B.I. 11 Tons, 1½" Stroke
Zeh & Hahneman, Single Action Cam Press, Spring Return Type, 35 tons cap.

LATHES

8"x15" Sundstrand, Model D
10"x22" Sundstrand, Model AA
12"x18" Lipe Carbo
12"x5' Sebastian
14"x6' Hendey
18"x6' American
20"x10' Lodge & Shipley
20"x25" Fay Automatics (1942)
22"x48" Centers Monarch (1942)
36"x30' Lodge & Shipley
50"x17' cc LeBlond (1942)

MILLING MACHINES

No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical (1942)
24" Cincinnati Production
No. 1-18 Cinn. Mfg.
No. 2-18 Cinn. Rise & Fall (1941)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 5-48 Cinn. Hyd. (1942)
No. 45-48 Cinn. Hyd. Duplex Tracer (1943)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-90 Cinn. Hyd. (1943)
No. 2 Hanson-Whitney Thread
4"x8" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x20" Pratt & Whitney, Model C
6"x36" Lees-Bradner Thread Miller
12"x54" Lees-Bradner—Model HT (1943)
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

DRILLS

24"—6 Spdl. Demco
No. 121 Baker

ReMANUFACTURED MACHINE TOOLS
(ORIGINATED BY US)
Reg. U.S. Patent Office

No. 217 Baker—(1943)
No. D-8 Colburn No. 8 M. T.
No. 3MS—24"—1 Spdl. L.G.
No. 2LMS—20"—2 Spdl. L.G.
No. 2 LMS—28"—2 Spdl. L-G (1945)
No. 2LMS—14"—3 Spdl. L.G.
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—28"—4 Spdl. L-G
No. 2 LMS— 26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS

34" King
42" Bullard New Era
52" King
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HOR. BOR. MILLS

No. 31—3" Bar Lucas
No. 3A—3" Bar Universal
Rockford, 3⅛" bar
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES

No. 4—48" Brown & Sharpe
No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

MISCELLANEOUS

Model H-7 Micromatic Vert. Honer
2500 Ton Lake Erie Hydraulic Press
No. 22-C Racine Shear Cut Hack Saw

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 601 Oster Rapiduction
No. 3 Jones & Lamson (1942)
No. 3 Bardons & Oliver, Bar Feed
No. 4 Gisholt (1942)
No. 5 Warner & Swaseys (1942)
No. 5 Bardons & Olivers (1942)
No. 5 Foster, A.C. & Bar Feed (1942)
No. 2-A Warner & Swasey
No. 6R Denver, A.C. & Bar feed
No. 1-L Libby, 6¼" Hole in Spindle (1937)
18" Libby, 3½" hole in spindle

GRINDERS

4"x12" Landis, Model H
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C Plain (1943)
16"x72" Norton Type C Plain (1944)
Norton Motor Driven Plain Grinders
6"x18" to 24"x240"

10"x24" Landis Type C Universal
12'x36" Landis Type LCH Universal (1945)

16"x16"x48" Thompson Hyd. Surface
No. 34 Abrasive Surface (1943)
No. 22—12" Heald Rotary Surface
No. 25A—16" Heald Rotary Surface (1942)

10"x72" Colonial Broach Grinder
No. 5—18" Besly Disc Gdr.

HILL-CLARKE MACHINERY CO.

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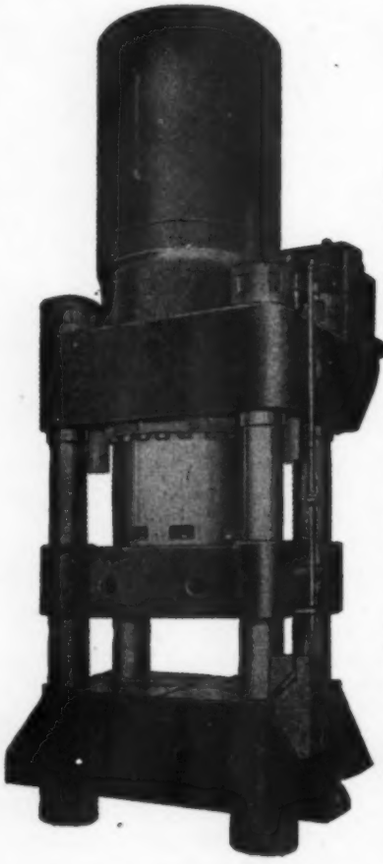

1300 TON WATSON STILLMAN HYDRAULIC PRESS Self Contained

Platen size 48" x 42". Stroke 22". Opening 46". Ram Diameter 35". Driven by 50 H.P. motor, also.

600 TON SOUTHWALK PRESS

Self contained 48" x 48" platen size, 65" stroke, 110" openings, 50 H.P. motor, 3 phase, 60 cycle, 220v.

1000 TON H.P.M. PRESS

Self Contained

Platen 72"x48". 36" stroke. 36" opening. 40 H.P., 3 phase, 60 cycle, 208-416 V motor.

1140 TON SOUTHWALK PRESS

Not Self Contained

Platen 11' 11" left to right, 11' front to rear. 48" stroke. 60" opening.

2000 TON BIRDSBORO PRESS

Self Contained

60" between rods left to right, 53" front to rear. Overall length of platen left to right 144". Stroke 30". Opening 36". 125 H.P., 3 phase, 60 cycle, 220-440 V motor.

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Incorporated

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SEMI-HIGH SPEED CENTER DRILLS $1.50 PER DOZEN NET ANY SIZE

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SIZE C-2	13/64"	1/16"	1⅞"
SIZE D-1	15/64"	5/64"	2"
SIZE E-1	3/10"	3/32"	2⅛"
SIZE E-2	3/10"	⅛"	2⅛"
SIZE F-1	7/16"	5/32"	2¾"
SIZE F-2	7/16"	3/16"	2¾"
SIZE J-1	1/2"	7/32"	3"
SIZE J-2	1/2"	9/32"	3"

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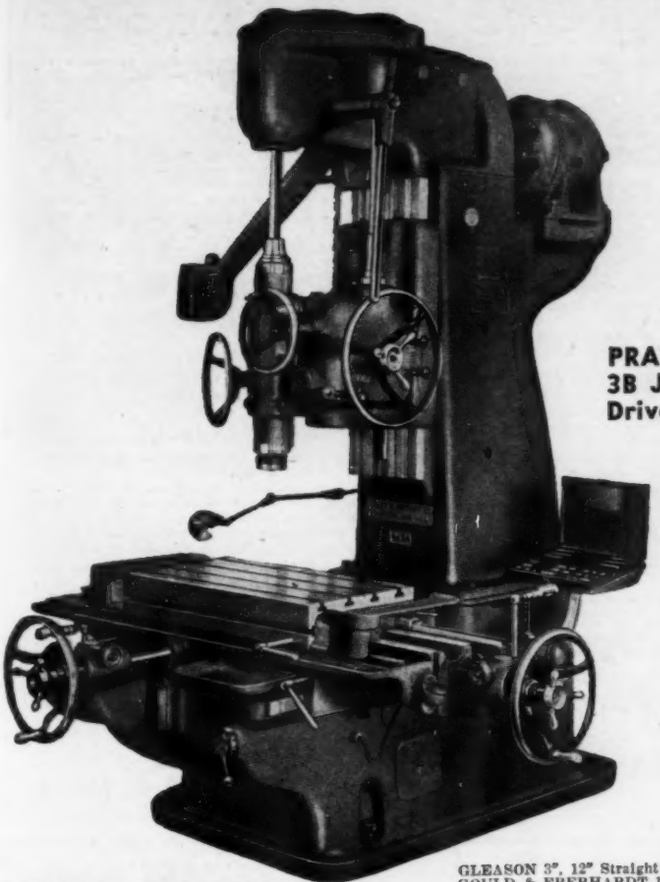
LATEST TYPE NEARLY NEW MACHINES



PRATT & WHITNEY 3B Jig Borer Motor Drive, Latest Type

BORING MILLS—Horizontal

DETRICK & HARVEY 4", 5" bar, Floor Type
GIDDINGS & LEWIS #32—3½" bar, M.D.
LANDIS #35, 3¾" bar, Floor Type
LUCAS #31 3" bar, M.D.
MORTON 60" traveling hd., combination borer, miller and driller, M.D.
NILES BEMENT POND 4¼" bar, Motor Drive
NILES BEMENT POND 5", 6", 7" bar, floor type, M.D.
UNIVERSAL 3" bar, latest type

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC, M.D.
BETTS (Consolidated) 84"—3 heads, AC, Latest
BULLARD 16"—6 spindle Mult-Au-Matic—Type D—Single indexing—Latest Type
BULLARD 24", 36" vertical turret, New Era Type, M.D.
BULLARD 24", 36" Ver. Turret, Spiral Drive, latest
KING 36" Vertical Turret, M.D., Latest Type
NILES 62", 75", 100", swivel heads—PRT, Motor Drive

BROACHES

LaPOINTE #4L, Horiz. hyd., latest type
LaPOINTE #SRV-25-66, 10-54, Vertical Surface, hyd., latest type

DRILLS

AMERICAN 3⅛"9", 5'13" Radial, motor drive
BAUSH #3, 4—Adjustable Multiple Spindle—M.D.
CINCINNATI BICKFORD 6'15" Plain and Universal Radial, motor drive
NATCO D5, D6 Adj., mult. spdle, latest type
FOSDICK 6' arm 19" column Economax, Hyd. Radial, latest type
WESTERN 5'13", 6'20" Radial—Latest Type

GEAR CUTTING EQUIPMENT

BARBER COLMAN #2 Hobber, Latest Type
BARBER COLMAN #3 Hob Sharpener, Latest Type
BROWN & SHARPE No. 3H gear cutter, M.D.
CROSS #73 univ. Chamferer, Latest Type
FELLOWS 61, #64, 615A, 645A3, 7, 7A, 72, 75A, 77, High Speed Gear Shapers, latest type
GLEASON 3", 12" Straight Bevel Generator, latest
GOULD & EBERHARDT 12H, 24H, 36H, 48H Hobber, latest type
GLEASON #7 Hypoid, Zerol, Spiral Bevel Generator, latest type
GLEASON 36" str. bevel gear planer, M.D.
GLEASON 11", 18" bevel generator, M.D.
GOULD & EBERHARDT 12HS Hobber, latest
PFAUTER #1, #2 with differential, M.D.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, 1 test type
CINCINNATI 6x18 plain Model EA, hyd., latest type
LANDIS 4x18, Type H, hyd., latest type
LANDIS 6x18, 10x18, Type "C", Hyd., Latest
LANDIS 30x220" Plain, Roll, Motor Drive
NORTON 16x72" Univ., Hyd., Type C, latest
NORTON 16x72" Plain Type "C", latest type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hyd.—latest type
BLANCHARD #11—16" chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
BLANCHARD No. 16A—Dial Type—motor drive
BLANCHARD #27-18 M.D., Latest Type
GALLMEYER & LIVINGSTON #35, 8x24" Hyd., latest
GALLMEYER & LIVINGSTON #55, 12x36" hyd., latest
HANCHETT Series 300—12x48 hyd., vert. spdl., latest
HEALD #22, 12" chuck, Rotary, latest type
HEALD #25A Rotary 16" chuck Hydraulic, latest type
MATTISON 12x14x60 Hydraulic, latest type
MATTISON 14x16x60 Hydraulic, latest type
MATTISON 20x24x72 Hydraulic, latest type
NORTON 6"x18"—Hyd.—Latest Type
NORTON 10x36 Hyd., Latest Type
THOMPSON 8x12x24 Hyd., latest type
THOMPSON 16x30x48 Hyd., Latest Type

LATHES—Engine and Mfg.

BETTS BRIDGEFORD 60"x24' bed, swing 84"
BRIDGEFORD 36"x28', 36"x32' bed—2 car., M.D.
HENDEY 14x8' geared, Engine, M.D.
JONES & LAMSON "Fay" 20x25" automatic TIMKEN, latest type
LEBLOND 17"x5', 20"x10' bed, Rapid Production, Timken Bearing, latest type
LEHMAN 16x30, hydratrol, Timken, latest type
LODGE & SHIPLEY 18"x72" centers, motor drive
LOSWING 4x60, 4x84, 8x60, 8x108, 5x24" centers, latest
MONARCH 10x20" centers, Model EE Timken, latest
MONARCH 16x28" centers, geared hd., M.D.
MONARCH 12"x30" centers, Timken, Latest Type
NILES 42"x60", double head, motor drive
NILES 48x35' centers, Heavy Duty, 2 carriage, Timken Bearing, PRT, Latest Type
NILES 48x32' centers, 2 carriages, MD
NILES 48x63' centers, Combination Boring & Turning, MD
NILES 48x87' centers, Combination Boring & Turning, MD
NILES 60x10', 35', centers, 1 or 2 carriages, Timken Bearing, PRT, Latest Type
NILES 72"x62', centers, combination Boring and Turning, Motor Drive
NILES 30x50' Boring, Timken, Latest Type
REED PRENTICE 16x24" centers, geared hd., M.D.
SPRINGFIELD 16x48" centers, geared hd., M.D.
SPRINGFIELD 16x24" centers, geared hd., M.D.
SUNDSTRAND 8x15", 12x22" stub, automatic, TIMKEN, latest type
WARD HAGGAS & SMITH 18/36"x10' bed, Gap

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken, latest
CINCINNATI ACME No. 1, No. 5W, Latest
GISHOLT #3, 5, Univ., Timken, Latest
GISHOLT #1L, #3L, Universal, Timken, Latest Type
JONES & LAMSON #3, 7C, 8A, Universal, Timken Bearing, Latest Type
LIBBY 1H-5, 5½ hole, Timken, Latest
MOREY No. 2G, No. 3, No. 4 Timken, latest
POTTER & JOHNSTON #5D2E, TIMKEN, latest
WARNER & SWASEY 3A, Universal 6" bar capacity, Timken Bearing, Latest Type
WARNER & SWASEY #5, Univ., Timken Bearing
WARNER & SWASEY #1A, 4A, Univ., Latest Type

MILLING MACHINES—Mfg.

CINCINNATI 3-24 Duplex Hydromatic, latest type
CINCINNATI 24", 48" duplex, TIMKEN, M.D.
INGERSOLL 32x30x12' Planer Type Slab, AC, MD
INGERSOLL 32x24x16' Planer Type, 2 heads, AC, M.D.
TAYLOR & FENN M-80 Duplex, Spline, latest type

MILLING MACHINES—Plain

BROWN & SHARPE #3B Timken, latest
BROWN & SHARPE #13 Timken Bearing, latest
CINCINNATI #4, Timken Bearing, Motor Drive
CINCINNATI #4H, motor drive
CINCINNATI 1-12, Timken, latest type
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI #2, 4 Dial Type, Timken, latest
CINCINNATI 0-8 Automatic rise and fall, Timken, Latest Type
KEARNEY & TRECKER #2K Timken, latest type
KEARNEY & TRECKER #4 heavy, Timken, latest
KEARNEY & TRECKER 1218, 1234, simplex, TIMKEN, latest type
KEMPSMITH #2, #4 Maxi-Mill, Timken, latest

MILLING MACHINES—Vertical

CINCINNATI No. 3, No. 4 High-Powered, M.D.
CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
GORTON 8D high speed with duplicator, latest type
GORTON 9J superspeed, with duplicator complete, latest type
REED PRENTICE #5 die sinker, latest type
REED PRENTICE 3VG with Hydraulic Duplicator, Timken Bearing, latest type

PLANERS

CHANDLER 36x36x20', 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84x84x18', 4 heads, AC, M.D.
NILES BEMENT POND 48x48x16', 2 heads, AC, M.D.
OHIO 42x42x20'—2 heads, AC, M.D.

SHAPERS

LAMAIRE 18' Vert. Hydraulic—latest type
LYND FARQUHAR 20" Openside, Motor Drive
MOREY 8", 10", 12", 14" Vertical, latest type
MORTON 48" Draw Cut, Motor Drive
PRATT & WHITNEY 6' 10" Vertical, M.D.

MISCELLANEOUS

BARNES #17B, 306H Vertical Hone, Latest Type
BILLINGS & SPENCER 1500 pound drop hammer
BIRDSBORO 325 ton vertical hyd. press, latest type
CLEARING Type DS-1125-32 double action Press 125 ton-75 ton, latest type
FERRACUTE DG-55, 75 ton Drawing Press, Tie Rod, 17" stroke, Latest Type
GISHOLT 3U Dynetric Balancer, latest type
JONES & LAMSON 6x15", 8x48" thread grinder, latest type
LANDIS 1" Bolt Threader—Latest Type
MORTON 60" combination traveling hd., planer, miller and borer, M.D.
PRATT & WHITNEY "Keller" Type G, Type BL2416—Latest Type
QUICKWORK Rotary Shear, ¾ cap., M.D.

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MACHINE TOOLS—*Subject to Prior Sale*

DRILLS

3'11" CANEDY-OTTO — RADIAL — 220/3/60/1800 — LATE TYPE — 1942 Mfg.

3'9" AVEY — Sensitive — RADIAL — Belt Drive.

GRINDERS

10"x24" LANDIS — Universal — Hyd. — 220/3/60 — Type C — 1944 Mfg. — Used 3 months.

#2 CINCINNATI — Tool & Cutter — 220/440/3/60 — Universal — Large assortment of accessories — LATE TYPE

7"x11" LEACH — Plain Cylindrical — M.D. — 220/3/60 LATE TYPE — 1942 Mfg.

6"x18" MONARCH — Surface — Hand feed — XLO mtzd. Spdle — 550/3/60 — with chuck.

#00 HEALD — Cylinder.

10"x14" MAJESTIC — Cylindrical — 220/3/60 — mtzd. work head — mtzd. wheel head pump — piping — LATE TYPE — 1943 Mfg.

10"x24" NORTON — Cam Grinder — Mtzd.

#13 BROWN & SHARPE — Universal — Tool & Cutter — Wet. attachment — Cabinet — Lg. assort. of access. — LATE TYPE — 1942 Mfg.

6"x32" NORTON — Plain Cylindrical — MD — 220/440/3/60.

#70A Heald — Internal — 220/3/60 — M.D.

LATHES & TURRETS

20"x54" REED-PRENTICE — 16 speed — Geared Head — Taper Attach. — 220/440/3 — with additional equipment — LATE TYPE — 1942 Mfg.

14"x30" LODGE & SHIPLEY — 12 speed — motor in base — TA — chuck — steps — 4 way tool post — 220/440 — other equipment — 1941 Mfg.

14"x6' HENDEY — Geared head — factory MD — chucks — less mtr.

10"x6' HENDEY — QCG — Taper attachment — Chuck — Collets — MD.

#5 JONES & LAMSON — Universal Turret — LATE TYPE — 1943 Mfg.

#2 BARDONS & OLIVER — 1" — Universal Turret — with bar feed — LATE TYPE.

#2 WARNER & SWASEY — PF to turret — Cross slide — BD — arr. MD.

14x8' Monarch — Engine — BG — Chuck, collets, motorized, Turner drive

MILLING MACHINES

#3K K&T "Milwaukee" Plain Horizontal — Power rapid traverse — 220/440/3/60 — motor in base — LATE TYPE — 1943 Mfg.

#3H K&T "Milwaukee" Plain Horizontal — Power rapid traverse — 220/440/3/60 — motor in base — LATE TYPE — 1942 Mfg.

#2K K&T "Milwaukee" Plain Horizontal — Power rapid traverse — 220/440/3/60 — motor in base — LATE TYPE — 1943 Mfg.

#34 OHIO — "Osterlein" — Universal — Belt drive — New dividing heads.

#2—24 CINCINNATI — Rise and fall — LATE TYPE — 1942 Mfg.

#3H K&T "Milwaukee" — VERTICAL — Power rapid traverse — Power feed to head — Motor in base — LATE TYPE — 1942 Mfg.

#2H K&T "Milwaukee" — VERTICAL — Power rapid traverse — Power feed to head — Motor in base — LATE TYPE — 1942 Mfg.

#5 BECKER — Vertical — Belt drive — Motor bracket — 12x48" table.

#1 United States — Hand — complete 220/440 late type — 1942 mfg.

PRESSES

DP53 FERRACUTE — 40 ton — SS — Motor driven — 220/3/60 — Plain — With side shear — 1940 Mfg.

#3K PERKINS — Screw — NEW.

SAWS

#4C COCHRAN-BLY — Cold — inserted tooth blade — MD — 220/3/60.

SCREW MACHINES

#00 BROWN & SHARPE — Fully automatic — Vertical slide attachment — Serial No. 7500.

#00G BROWN & SHARPE — Fully automatic — Serial No. over 11,000 — Motor driven slotting attachment — Swing stop and equipment — LATE TYPE.

#R4 NATIONAL ACME — 4 spdle — Fully automatic — 3½" cap. — 220/440/3/60 — complete assortment of equipment — LATE TYPE.

#0 BROWN & SHARPE — Fully automatic — Belt drive.

#R NATIONAL ACME — 4 spdle — Fully automatic — 1¾" cap. — LATE TYPE — Extra equipment.

2" GREENLEE — 6 spdle — Fully automatic — Motor driven — LATE TYPE — 1942 Mfg.

SHAPERS

16" GEMCO — "Lubrigard" — 220/3/60 — Power rapid traverse — Heavy duty — NEW.

28" AMERICAN — Back geared — Power feed to head — Single pulley drive.

32" GOULD & EBERHARDT — Universal — "Industrial" — Heavy Duty — Late Type — Mfg. 1942.

24" GOULD & EBERHARDT — Crank — Motorized with 4 speed drive.

7" LOGAN — Floor type — 110/1/60 — NEW.

16" Stockbridge Crank backgeared CD — with vise

SHEARS

36" PEXTO—Power squaring—Motor drive—16 ga.

42" WHITNEY — Power squaring motor drive — 220/3/60 — 16 gauge — NEW.

MISCELLANEOUS

DIE FILER — Harvey "Butterfly" — Model EL — 110/1/60 — LIKE NEW.

PLANER — Woodward & Powell — 30"x30"x12' — 2 rail heads — 2 side heads — Down feed and elevation — Box bed — BD.

PLANER — Whitcomb — 24"x24"x6' — Arr. for motor drive — Less elec. equip. — 1 rail head.

PUNCH & SHEAR — Williams & White — #11

HAMMER — Bliss — 300# — Beard drop.

CLUTCH CUTTERS — Waltham.

PROFILER—Pratt & Whitney—#13—Gear driven.

BORING MILL — UNIVERSAL — 3" bar — horizontal — MD — 220/3/60

SUPERFINISHER — Foster.

GEAR CUTTER — Brown & Sharpe — #6 — 72" spur.

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34 HERMAN STREET — **WORCESTER 8, MASS.**

SURPLUS EQUIPMENT

AVAILABLE FOR IMMEDIATE DELIVERY

#3 Waterbury-Farrel punch press, capacity 20 ton stroke 2½", ram adjustment, 60 strokes per minute, shut height, 6½", bed size F to B 10½", R to L 14½".....$475.00

#6600 Waterbury-Farrel punch press, cap. 56 ton, vertical back geared, open back, straight sided stroke 6", 60 strokes per min., 20" shut height, distance between uprights —46", bed size 10"x45", 5 HP motor, push button switches, V drive.....$1750.00

#PG-6 Ferrecute Punch Press geared 1¾" stroke, bed area R to L by F to B 34¾x23. Opening in bed R to L by F to B 16x14. Slide adjustment. Height overall 103".....$2750.00

Van Norman Horizontal Milling Machine with 2 direct drives. Milling heads motorized, serial number 11065.....$642.00

#5 Waterbury-Farrel blanking & cupping press.....$380.00

#35P Toledo punch press, gap type, flywheel 48"x7", bed size 27"x18", stroke 1¾", 15" from bed to bottom of rain ways, motor rack, not motorized. Pitman strap and eccentric just rebuilt.....$1500.00

Model RA-6, six-spindle Acme-Gridley automatic, 9/16" bar cap., including tooling and equipment, serial #22377A, practically new.....$3950.00

Spot welder, 75 KVA gun type with air control, model SIDS5, serial #2801, Progressive.....$650.00

BILLARD MACHINE & TOOL CO.

PHONE 44 — **MANSFIELD, PA.**

PRESSES

STRAIGHT SIDE—60 ton, 5" stroke, 48x24 bed, late model Waterbury Farrell (15).

90 ton, 8" stroke, 50x18 bed, Bliss (3), 42'
200 ton, 32" stroke, 27x27 bed, Bliss, 43'
#56 Toledo, 4" stroke, 21x21 bed, 15½" shut height.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss $850.00 ea.
70-85 ton, 4" stroke, 21x27 bed, 110 strokes per min., Bliss, latest type.
90-125 ton, 4½" or 5½" stroke, 60, 80, 110 (optional) strokes per min., latest type.
INCLINABLE—#21 ½A Bliss, brand new, w/ cushions, 6" stroke, 18" shut height (3).
55 ton Walsh, brand new, 3½" stroke, 9" shut height.
15 ton, new $363.00; 4½ ton, new $165.00.
35 ton, Toledo Herning, 2" stroke.

AUTOMATICS

1⅝" Acme Gridley, 6 spdl. latest type (2).
2½" Cone, 6 spdl., latest type (4).
16" 8 spdl. Bulard Multaumatics, pract. new, $9000.00 ea. (5).

Horiz. Boring Mills Table Type, late design.
5" Sellers, 84x48 tbl., 72" vert. trav. spdl.
5" Giddings & Lewis, 84x48 tbl, 60" vert. trav.

BRAKE

10'x½" Henderson Power Press Brake, 30 HP motors and controls. Just taken out of operation.

SPOT WELDERS & BUTT WELDERS

Prompt delivery, 5 to 300 KVA, Brand new, guaranteed.

PAUL'S MACHINERY COMPANY

MONA MEMBER

6111 Vermont Avenue
Detroit 8, Michigan
TYLER 7-6300

Bor. Mill Hor. 3" G & L. M.D.
Boring Mills, 24"-36"-42"-52"-72"-96"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 8-A W. & S., B.P.D.
Millers, Plain No. 2 K & T, No. 4 Cin.
Millers, Vertical No. 2 B & S & No. 4 Cin.
Profiler, #13 P. & W., B.D.
Shapers, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.

West Penn Machinery Company
1219 House Bldg. — Pittsburgh, Pa.

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders.

MONA MEMBER

B. D. BROOKS, INC.
381 Atlantic Ave., Boston, Mass.

1—No. 2 Cinn. Centerless Grinder, M. D., late type.
10—No. 00G B & S Automatics, high speed.
1—Landis 4" Pipe Threading Machine.
3—Model B Davenport Automatics.

MONA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N. Y.

CONTACT Eastern Before You Buy REBUILTS

VERTICAL BORING MILLS

24" Bullard New Era, m.d., with side head
36" Bullard Spiral Drive, m.d., with side head
36" Bullard Spiral Drive, m.d., with side head, high speed type, latest type
42" Bullard New Era, m.d., with side head
42" Bullard Spiral Drive, m.d., with side head
42" Colburn H. D., 2 swivel heads, m.d.
48" Cincinnati Rapid Production, m.d., 1 turret, 1 swivel head
48" Colburn, m.d., 1 turret, 1 swivel head
48" Putnam H.D., m.d., 2 swivel heads
54" Colburn H.D., m.d., 1 turret, 1 swivel head
84" Niles H.D., m.d., 2 swivel heads
100" Niles H.D., m.d., 2 swivel heads

BALL BEARING DRILLS

Allen Bench Type, m.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2½ Allen, m.d., latest
No. 5M—16" Fosdick, m.d.
2 spindle No. 2 Avey MA6, m.d., latest
2 spindle No. 2 Avey, belted m.d.
2 spindle 21" Canedy-Otto, m.d.
3 spindle No. 2 Avey MA6, m.d., latest
3 spindle No. 3 Avey, belted m.d.
4 spindle No. 2 Avey, belted m.d.
4 spindle No. 2 Avey MA6, m.d., latest
4 spindle No. 2 Avey, belted m.d.

UPRIGHT DRILLS

21" Cincinnati-Bickford, m.d.
28" Cincinnati-Bickford, m.d.
30" Rich H.D., m.d.
32" Aurora, belt
40" Aurora, belted m.d.
H#3 Barnes Hydram m.d., late
D4 Colburn H.D., m.d.
D8 Colburn H.D., s.p.d.
No. 25 Foote-Burt H.D., m.d.
No. 36HO Baker H.D., m.d.

MANUFACTURING TYPE LATHES

No. 4 R. K. LeBlond Boring Lathe, 37' bed, 13" hole, m.d., latest
Model 8 Sundstrand Auto. Stub Lathe, m.d., latest
No. 9 H.D. LeBlond Multi-Cut Lathe, m.d.
3½x80", 3½x36", 8x84" LoSwing, m.d.
4x60" LoSwing, m.d., latest type
8x132" LoSwing, m.d., latest
9x12" Sundstrand Mfg., m.d.
11"x18" centers LeBlond Rapid Production, m.d.
13x24" Coulter Automatic Threading, m.d.
13x48" Coulter Automatic, m.d.
13x96" Coulter Automatic, m.d.
15"x6' Coulter Automatic, m.d.
16"x6' Cincinnati Mfg., m.d.
16"x6' LeBlond Rapid Production, m.d.
17"x6' LeBlond Automobile Mfg., cone
17"x8' LeBlond Rapid Production, m.d.
20"x8' LeBlond Mfg. Type, m.d.
20"x16' American arranged for spindle boring
21"x8' LeBlond Turret, cone
Niles-Bement-Pond Quartering Machine, new
Type NA 2B Schauer Machine Co. Speed Lathe, m.d.

PLAIN MILLING MACHINES

No. 000 Brown & Sharpe, m.d., latest
No. 0-8 Cincinnati Model EA Plain Automatic, m.d.
No. 1A Milwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 2 Cincinnati, cone
No. 2B Brown & Sharpe, m.d. in base, dial type, latest
No. 2 Cincinnati H.S. Dial Type, m.d. in base, latest
No. 2L Cincinnati, m.d. in base, late
No. 2HL Milwaukee, m.d. in base, latest
No. 3S Cincinnati, m.d.
No. 3 LeBlond, cone
No. 3K Milwaukee, m.d. in base, latest
No. 3 Osterlein, cone
No. 4 Cincinnati H.P., m.d.
No. 5B Heavy Brown & Sharpe, m.d.
No. 5 Cincinnati, rect. overarm, N.S.S., late
No. 5 Cincinnati, rect. overarm, m.d.
No. 5 H.D. LeBlond, m.d.

MANUFACTURING TYPE MILLING MACHINES

No. 00 Sundstrand Hydraulic Rigidmill, m.d., latest
No. 08 Cincinnati EA Plain Automatic, m.d., latest
No. 08 Cincinnati EA Plain Automatic, m.d., with rise & fall, latest
No. 1-12 Cincinnati Plain Automatic, m.d.
No. 1-18 Cincinnati Plain Automatic, m.d., latest
No. 2 Sundstrand Electromill, m.d., latest
M24 Milwaukee Simplex, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., with rise & fall, latest
No. 3-24 Cincinnati Plain Hydromatic, m.d., latest
No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. 3A Sundstrand Copy Rigidmill, m.d.
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, m.d., with tracer control, latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
4" Pratt & Whitney Spline, m.d.
18" Cincinnati Mfg. Type, m.d.
18" Cincinnati Plain Automatic, m.d.
24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, s.p.d.
24" Cincinnati Duplex Automatic, m.d.
28" Cincinnati Plain Automatic, s.p.d.
48" Cincinnati Duplex Automatic, m.d.
Type P Ohio Mfg., m.d.
Hall Planetary Thread, m.d.
4½x12" Pratt & Whitney Thread, belt
6x14", 6x48", 6x80" Pratt & Whitney Thread, belted m.d.
6x20" type B Pratt & Whitney Geared Head Thread, m.d.
10x24" Hansen-Whitney Thread, m.d.
No. CT-36 and CT-54 Lees-Bradner Thread, m.d., latest
Carter & Hales Mfg. Type, m.d.
24"x6' Ingersoll Slab, m.d.
30"x36"x12' Ingersoll Slab, m.d., 2 rail heads
36"x24"x8' Ingersoll, 1 rail, 2 side heads, m.d.
Burr Mfg., belted m.d.

UNIVERSAL MILLING MACHINES

No. 1 Cincinnati, cone, old
No. 4A Brown & Sharpe, m.d.
No. 4G LeBlond, m.d., with vertical slotting attach.

PRESSES

No. 3 Loshbough-Jordan O.B.I. Press
No. 20 V. & O., m.d., 1" stroke
Chambersburg 50 ton Hydro-Pneumatic, 13" stroke
B45 Metalwood Hydro-Penumatic, 10 tons
B33 Metalwood Hydro-Penumatic, 15 tons

PUNCHES & SHEARS

No. 6 Long & Allstater S.E. Punch, belt
No. 2 Niagara Bench Type
Pedrick & Ayer Pneumatic Punch, 6" throat

SAWS

6x6" Peerless H.S. Hack Saw, 3 speed gear box
6x6" Peerless H.S. Hack Saw, m.d.
13x13" Peerless Universal Shaping Saw, m.d.
7½ H.P. Cincinnati Elec. Tool Co. type JCAW Abrasive-Saw, m.d.
No. 3 and 8 Nutter & Barnes Cold Saws
No. 6 Cochran-Bly Cold Saw, s.p.d.
No. 138 Espen-Lucas Cold Saw, m.d.
No. 11½ Higley Cold Saw
5" Newton Cold Saw
Gustav Wagner Cold Saw, m.d., 28" blade
Gustav Wagner Cold Saw, m.d., 22" blade

SHAPERS

6" Pratt & Whitney Model B Vertical Shaper, m.d., with rotary table

SHEE METAL MACHINERY

Southwark Rotary Metal Cutter, 36" throat, m.d.
Gray Turret Head Metal Cutter, 36" throat, m.d.
No. 1 Savage Nibbler, m.d.
120" No. 100 Niagara Heavy Production Folder, m.d.

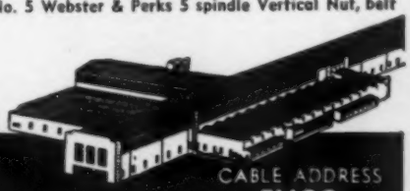
SLOTTERS

12" Bement-Miles Slotter, m.d.
15" Canada Slotter, m.d.
48" Niles-Bement-Pond Geared, m.d.

TAPPING MACHINES

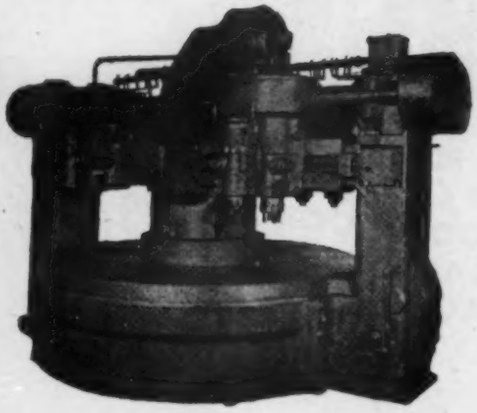
No. 1 Bakewell Precision, m.d., latest
No. 2 Bakewell Precision, m.d., latest
No. 5 Webster & Perks 5 spindle Vertical Nut, belt

THE ABOVE IS ONLY A PARTIAL LISTING. WRITE US YOUR NEEDS. LET US QUOTE.



THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio ◊ MElrose 1241
CABLE ADDRESS EMCO

Newton Type V-4 Continuous Rotary Milling Machine



Equipped with 2 double heads, and 2 single heads, diameter spindle sleeves 6⅝" complete with 25 H.P. motor.

An ideal machine for continuous production of cylinder blocks, bases and a multitude of similar parts.

EMERMAN MACHINERY CORP.

875 W. 120TH ST. CHICAGO 43, ILL.

GEAR CUTTERS

NEW — H.S. STEEL • FIRST QUALITY

INVOLUTE 1P to 48P } *ALL LISTED*
BEVEL 3P to 24P } *PITCHES*

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DeWITT TOOL CO. 173 Grand St., N. Y. 13, N. Y.

STOCK TOOLS — *Prompt Shipment*

AIR COMPS., 50, 130, 220 & 350 c.f., 100#
AUTOMATICS 3½" Cone 4-Spindle (4)
BOLT CUTTERS, dbl. head, 1", 1½" & 2"
BOR. MILLS, 2½" bar, Cleveland, M.D.
BORING MILLS, 3" bar Universal
BORING MILL, Hor. 3½" Landis Floor Type.
BORING MILL, 36" Bullard, "New Era"
BORING MILL, 36" King, 2 heads, M.D.
DRILL, Radial 6' Carlton, M.D.
GEAR SHAPER, #78 Fellows, M.D.
GRINDER, Internal, No. 72A5 Heald, 2 Mtr. Hyd.
GRINDER, Plain 14"x72" Norton
GRINDERS, Surf. Nos. 3 & 5 Abrasive
GRINDER, Surface, No. 25 Heald Rotary
HAMMER, Pneu., No. 6B Nazel, M.D.
LATHE, 20"x12' L & S, 12 Speed, Grd. Hd.
LATHE, 24"x18' B & E Grd. Hd.—1940
LATHE, 27"x18' Niles "Timesaver," Grd. Hd.
LATHE, 38"x19' Putnam, Grd. Hd. Q.C.G., T.A.
MILLER, Plain, Nos. 3S, 4 & 5 Cincinnati.
MILLER, Thread, No. 40 Lees-Bradner
MILLER, Univ., No. 4 Cincinnati, B.D.
MULT-AU-MATICS, Bullard Type A, 6 Spdle.
SHAPER, 24" Steelbridge, M.D.
SHAPER, 32" Smith & Mills, M.D.
SHEAR, Plate, 84"x¼" Canton, M.D.

PARTIAL LIST

LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

McDONALD
USED MACHINERY

G & E 24" Cin. 32" Shapers
Cleveland O.S. Planer 36"x8', 2 hds.
Abrasive #34 M.D. Vert. Surf. Grinder
Cincinnati D. H. Planer 36"x36"x10', 2 hds.
Monarch 20" grd. hd., M.D. Lathe 16 sp. Speeds Model "M"
Bullard Vert. Turret Lathes, 24" & 36" S. Head
Defiance 3" Horiz. Boring Mill & Univ. #3-A
L & S 18x12' & 20'x10' 20"x8' Grd. Hd. M.D.
& 28"x12' Lathes Monarch Model "C"
American 24'x12 grd. hd. lathe, m.d. q.c.g.
Amer. 4-ton vert. Hydr. Broach
Blanchard Vert. Surf. Grinder, 26 rd. chuck.
Cincinnati #2 Centerless Grinder.
Colburn 60" & 72" Vert. Boring Mills.
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd. S.P.D. Pl. Miller.
Milwaukee No. 3-B Vert. Miller grd. hd., m.d.
Cin-Bick 3' Super Serv. Radial
Gisholt 3R Grd. Hd. M.D. Turret Lathe
W.&S. No. 2A grd. hd. Univ. Turret Lathe, S.P.D.
Foster No. 2F Fostermatic grd. hd. Turret Lathe, M.D.

MONA MEMBER

McDONALD MACHINERY CO.
1531-35 N. B'way, St. Louis 6, Mo.

MILES' QUALITY

Automatic, 2⅝" Acme Gridley RA6
Automatic, 12"x63", 14"x19" & 16"x33" Fay
Broach, Twin 10 & 3XA Oilgear
Broach, 2S, 3H LaPointe
Drill, 3'9" & 4'9" Cint. Bick. radial
Drill, 21" & 24" Cint. Bick. upright
Drill, Nos. 11, 14 & 30 Natco multiple
Drill, Nos. 121, 217, 314, 315, 321 Baker
Drill, 24", No. 3 Avey matic 2 spindle
Gear Hobber, Nos. 3, 12 & Type D Barber Colman
Gear Hobber, Nos. 16HS, 12H & 8H G. & E.
Gear Hobber, No. 5M Adams Mfg.
Gear Hobber, No. 130 Cleveland
Gear Hobber, Nos. 1 & 5AC Lees-Bradner
Gear Shaper, Nos. 7 & 61 Fellows
Grinder, Centerless, Nos. 2 & 3 Cincinnati
Grinder, 6"x18" No. 10 Brown & Sharpe
Grinder, 10"x18" Cincinnati
Grinder, 6"x18", 10"x18" & 16"x36" Landis
Grinder, 6"x18" & 10"x72" Norton
Grinder, 12"x36", No. 2 B. & S. univ.
Grinder, No. 115 Gardner opposed disc
Grinder, Disc, No. 226 Gardner
Grinder, Surface, 10"x24" Norton hydraulic
Grinder, Surface, 12"x48" Thompson hydraulic
Grinder, Surface, 14"x60" Mattison hydraulic
Grinder, Surface, 12", 16" & 24" Heald rotary
Grinder, Surface, Nos. 10 & 16 Blanchard rotary
Lathe, 14"x8' Hendey toolroom
Lathe, 22"x96" Monarch
Lathe, 25"x48" LeBlond
Lathe, 36"x16' bed Bridgeford
Lathe, Turret, Nos. 2, 3, 4, 5 & 1A & 3A Warner & Swasey
Lathe, Turret, No. 3, 4, 5 & 1L Gisholt
Lathe, Turret, No. 2 Cint. Acme saddle type
Lathe, Turret, No. 601 Oster
Lathe, Turret, No. 5 Foster
Lathe, Turret, No. 5 Bardons & Oliver
Lathe, Turret, Nos. 2G & 3 Moray
Lathe, Turret, 24", 36" Bullard vertical
Lathe, Mfg., 14"x18" Monarch Magnamatic
Lathe, Mfg., 6", 8", & 15" Sundstrand auto. stub
Lathe, Mfg., Mod. 10x40" Sundstrand center drive
Mill, 3¼", No. 0 Giddings & Lewis
Mill, 3½" bar Universal
Mill, 4¾" bar Giddings & Lewis floor type
Mill, 7" Barrett cylinder boring
Mill, Vertical, 53" & 100" Niles-Bement-Pond
Mill, Vertical, 96" Cincinnati
Millers, Nos. 2AS, 3B & 4B Milwaukee plain
Miller, No. 3 Cincinnati universal
Miller, No. 3 Van Norman duplex
Miller, Nos. 3 & 4 Cincinnati dial type
Miller, Nos. 2M, 2, 3, 4 & 4HD Cincinnati vertical
Miller, No. 2H, 3H & 4H Kearney & Trecker vertical
Miller, Nos. 2-24, 3-24, 4-36, 4-48, 5-48, Cincinnati Hydromatic
Miller, No. 33 Sundstrand, 18"x120" table planer type 2 vertical spindles
Miller, No. 12-24" Brown & Sharpe Mfg.
Miller, 30" & 66" Newton rotary
Miller, 30", 42" & 84" Ingersoll rotary
Miller, Nos. 4 & CT36 Lees-Bradner thread
Miller, No. 3 Planomill thread
Planer, 33"x33"x8' Cincinnati
Planer, 48"x48"x12' Cincinnati
Press, Nos. 10, 73½ & 304 Bliss S.S.
Press, Nos. 56 & 56½ Toledo S.S.
Press, 70 ton Verson, cushion
Press, 1000 ton No. 666 Toledo coining
Press, 100 & 200 ton Hydraulic
Roll, No. 18 Kane & Roach straightening
Saw, No. 302 Campbell abrasive
Saw, 42" Tannewitz metal band
Shaper, 6" Pratt & Whitney vert.
Shaper, 12" Whipp
Shaper, 16", 20" & 28" Gould & Eberhardt
Shaper, 20" & 24" Gemco universal
Shaper, 36" Rockford shaper planer
Tapper, No. 1 Bakewell
Tapper, Nos. 2 & 2X Garvin
Upsetter, 1" National High Duty
Upsetter, 1½" Acme

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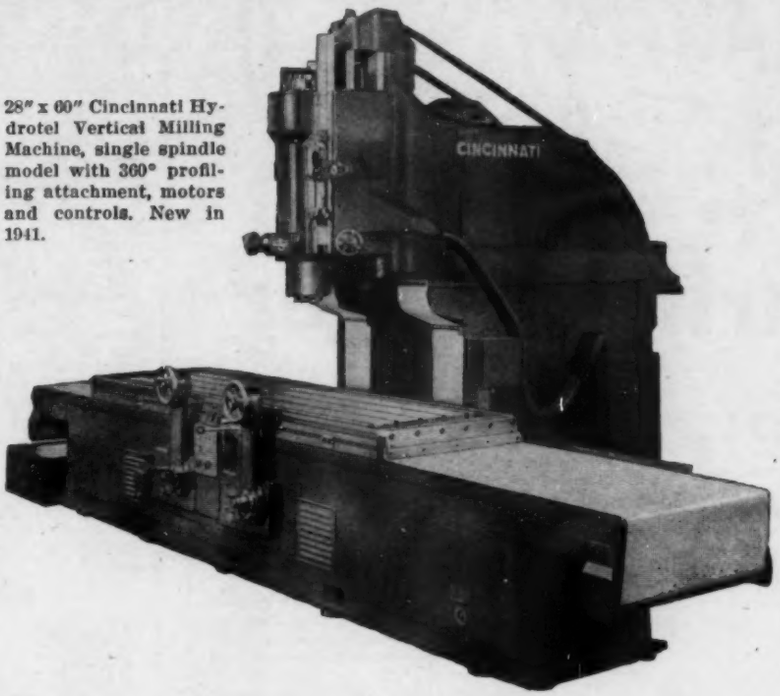
MILES MACHINERY CO.
SAGINAW, MICH.

QUALITY *Machine Tools* NOW IN STOCK



28" x 60" Cincinnati Hydrotel Vertical Milling Machine, single spindle model with 360° profiling attachment, motors and controls. New in 1941.

AUTOMATICS

9/16" RA-6 Acme-Gridley. New in 1943.
1" RA-6 Acme-Gridley. New in 1943.
1⅝"—8 spindle Conomatic. New in 1942.
5½" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe. 1941.
★ Bullard Multaumatic, six spindle model D, single index. Late model.

BROACHES

No. 28L LaPointe Hyd. Horizontal. 1942.
No. CPC 8-24 LaPointe Hyd. Vert. 1943.
No. CPC 6-36 LaPointe Hyd. Vert. 1943.

DRILLS

6 Ft. American radial 17" column.
★ No. 26HO Baker Hydraulic, single spindle, 3" capacity in steel, with motor and control. Latest type.
42" Cincinnati-Bickford, single spindle.
No. 3 Avey, three spindle, heavy duty.
No. 3 Baush Multiple Spindle.
Barnes Horizontal Deep Hole, 2 spindle.
Taft Peirce Horizontal, double end.

GEAR CUTTERS

No. 16H Gould & Eberhardt Universal Hobber. Latest type.
No. 7A, 7125A Fellows Gear Shapers.
No. 615A, 645A, Fellows Gear Shapers.
No. 12 Barber Colman Hobber.

GRINDERS

No. 2 & No. 3 Cincinnati Centerless, Filmatic spindle. 1941.
14" x 48" Cincinnati Plain, Filmatic spindle.
10" x 36" Landis Hydraulic. New in 1943.
6" x 18" Cincinnati Hydraulic, Filmatic spindle. New in 1943.
No. 3 Brown & Sharpe Universal. New in 1943.
No. 2 Norton Universal Tool.
No. 18 Blanchard, 30" chuck. 1942.
14" x 16" x 60" Mattison Surface.
No. 75A Heald Internal. New in 1943.
No. 72-A-3 Heald Sizematic. New in 1943.
No. 16-16 Bryant Internal, Hydraulic, Used less than 2 years.

LATHES, ENGINE

Monarch Toolmakers 10" x 20" Model EE.
Lodge & Shipley 20" x 48". New in 1943.
★ Bertram 28" x 240" "Timesaver", two carriages, with rapid traverse. Canadian made from Niles patterns. 1942.
Lodge & Shipley 48" x 54", cone driven.
Carroll Jamieson 18" x 5', C.D.
LO-Swing, IMP & LR.
South Bend 14½" x 6', c.d.
Lipe Carbomatic, 15" x 30".
LeBlonde Production, 17" x 30".

LATHES, TURRET

Warner & Swasey No. 2A, preselector. New in 1943.
Warner & Swasey No. 1A, preselector. New in 1940.
Gisholt No. 1L, hydraulic speed selector. New in 1943.
Warner & Swasey No. 5 Universal. 1943.
Gisholt No. 5 Universal, Hydraulic speed selector. New in 1944.
Foster No. 5 Universal, Bar feed. 1943.
Warner & Swasey No. 4 Universal, preselector. New in 1943.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 3 Universal, two speed. New in 1942.
Bardons & Oliver No. 3 Universal, motor in base. New in 1941.
Warner & Swasey No. 2, oversize. 1942.
Bardons & Oliver No. 2 bar feed. 1941.
Brown & Sharpe No. 1, M. in B. 1941.
★ Bullard New Era VTL, 36" x 42".

MILLS

Van Norman No. 2SU Universal.
Gorton No. 9J Vertical, with tracer.
Cincinnati No. 2MH Plain, latest model.
Cincinnati Vertical, No. 3 Mod. S. Dial.
Milwaukee Vertical, No. 2H. New in 1942.
Cincinnati Rise and Fall No. 1-12 & 2-18 Millers. New in 1943.
DeVlieg Supermill No. 31B Sundstrand Electromil No. 2.
Whitney Hand Mill, No. 6.
★ 72 Betts Vertical Boring Mill, two heads, DC drive with AC/DC generator. New in 1943.

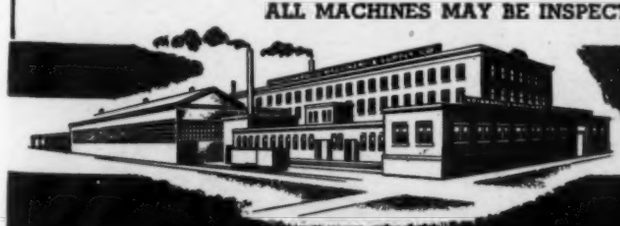
MISCELLANEOUS

No. 5B Standard OBI Press. New.
No. 7 Kling Punch, 1¼" through 1", 72" throat.
No. 8-6 Zeh & Hahneman S.S. Geared Press.
Pratt & Whitney Profiler, No. 12D.
Tapper, Leland Gifford 3' Radial, No. 3 MT. New in 1941.
24" Cincinnati Worm Feed Rotary Table.
Lindberg Model B6 Elec-Furnace, high speed.

PLANERS AND SHAPERS

Cincinnati Planer, 42 x 42 x 20, D.C.
Cincinnati 24" Shaper, Universal table. New in 1945.
American 24" Shaper.
Gould & Eberhardt 24" Shaper.
Cochrane & Bly No. 14 Vertical Shaper. New in 1942.
Pratt & Whitney 6" Vertical Shaper. New in 1943.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSE



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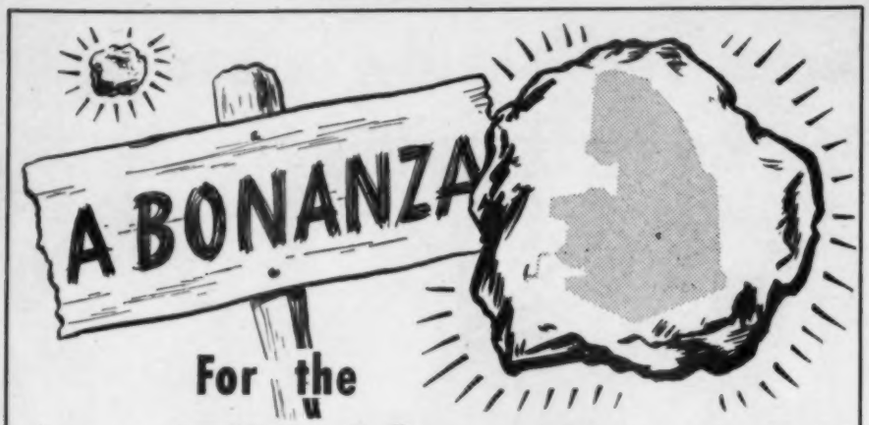

Thrifty Buyer

LATHES

1—Bridgeford 36"x56', 15 speed, grd. hed., Eng. Lathe, M.D. AC elect. equip. power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 26" over carr., dist. betw. cens. 48', mtzd. apron and taper attmts.

Hendey 12", 14", 16" and 18" Tool Room Lathes, M.D. 6', 8', and 10' beds.

1—Monarch EE 16"x20" Sensitive Precision Toolmakers' Lathe, motor driven, sw. over bed 12½", dist. betw. cens. 20", taper attmt. used 6 mos.

3—L. & S. 12"x6', 12 speed, selective grd. hed., pan bed, Tool Room Lathes, sw. over ways 14½", dist. betw. cens. 34".

BORING MILLS

2—Bullard 36" "Spiral Drive", Vert. Bor. Mill, face of turret to tbl. 34", clear under cross rail 27¼", vert. trav. of turret 26⅜", clear under S.H. slide 16", 3 and 4 jaw chuck, approx. wght. 17,500 lbs.

Bullard 100" motor driven, rap. prod. Vert. Bor. Mill, cap. 102" in diam., 84" in hght., tbl. diam. 92", wght. approx. 80,000 lbs.

PLANERS

1—Putnam 84"x84"x40' Dbl. Hous. Planer, Revers, M.D. and controls, 2 hds. on cross rail, 2 side hds., just taken out of service.

Chandler 36"x36"x10' Planer, 2 heads. on cross rail, motor driven, heavy duty.

MILLERS

1—Milwaukee No. 3B Univ. Miller, tbl. wkg. surf. 55"x15", 3 jaw Univ. chuck, feeds: long. 36", cross 12", vert. 20", spin. speeds 18, range 13-320 RPM. AC motor driven.

B. & S. #1½A Bk. Grd. Constant Speed, Univ. Miller, tbl. wkg. surf. 36¼"x10¾", power feeds long. 24½", cross 7½", vert. 19", AC motor driven.

1—Cin. #5 Plain Hor. Mill. Machine, rect. overarm High Power Miller, tbl. wkg. surf. 79"x21" power long. feed 50", cross 14", vert. 21".

2—Milwaukee No. 2K Pl. Hor. Miller, very latest type, tbl. wkg. surf. 45"x12", tbl. overall 56"x12", feeds: long. 28", cross 10", vert. 17", M.D.

1—Van Norman No. 36, ram type, Hor. Miller, tbl. wkg. surf. 58"x13", feeds: long. 33", cross 12", vert. 22¼", power rap. trav., Ser. No. 5398, very latest type, motor driven.

PRESSES

1—Farquhar 100 Ton Hyd. Press, daylight 48", stroke 36", approach and return speed 1600' per min., given maximum variation 5 degrees, wght. 44,000 lbs., elec. equip. 440/3/60, condition equal to new.

1—Toledo No. 66 Knuckle Jointed Embossing and Coining Press, capac. 1000 Ton, stroke 2", shut height 18", width betw. uprights 32", width between gibs 25", wght. approx. 90,000 lbs.

GRINDERS

B. & S. #5, 3"x18" Cyl. Grinder, latest type; spin. speeds 1772 and 2077.

1—P. & W. Vert. Hydraulic Surf. Grinder, Type M-1640, chuck 14"x60", motor driven, 30 HP on spin. segment chuck wheel, very latest type, equiv. to new.

MISCELLANEOUS

Steckbridge 24, motor driven, Crank Shaper, single pulley driven, stroke 24¾", vert. trav. of tbl. 15", hor. tbl. trav. 30".

1—Standard Mchy. No. 8, 800 lb. Automatic Hammer.

1—Fairbanks-Morse, 2 cylinder, 2 cycle, 12"x15", Diesel Engine, Model No. 32E12, Generator capac. 76.8 K.V.A., 550V, 3 phase, 60 cycle, capac. 120 H.P.

1—Schuster 14" Wire Cutting Straightening Machine.

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National Bent Shank Nut Tappers—Battery of ⅝" and ⅞" Machines.

2 Landis ¾" Bolt Formers and Threaders, M.D.

1 National ½" to 1" Hot Bolt Head Trimmer

Woodward & Powell 42"x42"x36 ft. 4 Head Planer

Cincinnati 36"x36"x16 ft. Planer, M.D.

1 Lodge & Shipley 36" Swing by 44 ft. Bed, Selective Geared Q.C. Lathe, M.D.

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B4B NATCO 48-spdl. Holesteel Drill

3'-11" American Hole Wizard Radial

#12 Landis Centerless Grinder

16"x24"x72" Matthson Surface Grinder

6"x18" Norton "C" Hydraulic Grinder

6"x30" Norton "C" Hydraulic Grinder

#1248 Kearney & Trecker SIMPLEX Miller

#3HS Cincinnati Vertical Miller

#2—#3—#4—#5 Warner & Swasey Universal Turret Lathes

#1 Brown & Sharpe Wire Feed Hand Screw Machines

ALL LATEST TYPE MACHINES

HAZARD BROWNELL

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MACHINE TOOLS

Specials

P & W #2A Jig Borer, New 1945
Clearing 90-10 Press Brake—10' 10 Ga.
Fosdick 24" Sliding Head, Box, Late
56 Ton Thomas OBI Press, New 1947
Gorton Duplicators and Vert. Millers
Gorton No. 3Z, 1D, ME Engravers
B. & S. No. 2 Vert., Swivel Head
Norton, Doall Surface Grinders 8"x24"
Marvel 6A Hacksaw, M.D., Auto, Feed
Injection Moulders, Hydraulic Presses

BORING MILLS

#0 Giddings & Lewis arr. M.D.
2½" Cleveland arr. M.D., 2½", 4" Binsee
Niles-Bement-Pond 4" duplex, Universal 3"
66" Niles; 54" Colburn M.D. 2 hds.
Bullard New Era 24", 42", Vert. M.D.

TURRET LATHES

W. & S. Nos. 3, 4 Grd. Hd., Preselector
Gisholt No. 1L, 2L Univ. M.D.
Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
J. & L. 2¼"x24", 3¼"x36"
Acme #2 M.D.

GRINDERS

Abrasive 3B 8"x24" Surf., #34 Vert.
#25 Gallmeyer & Livingston Hyd. Surface
#25A Heald, M.D. like new Rotary Surf.
No. 2 Cincinnati Centerless M.D.
B. & S. No. 2, 2B Surface, M.D.
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28', M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl.
No. 55, 60, 65 Heald int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.; 1, 3 Univ.
Norton 6x18", 8x24" Hyd. Surface, M.D.
Covel #91A Tool, New 1941, Cinn.
Norton #2 Tool & Cutter, 1942

LATHES

26x14' Springfield Grd. Hd., late
Monarch Hendey 12x30, 10x20 G.H. Late
26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
20"x30' Boye & Emmes Grd. Hd., Late
South Bend, M.D., T.A., 16"x10', 9"x3'
Sundstrand Centering Machine #56, 4"x54"

AUTOMATICS

Cone 8 spindle, 1⅞" Late
Cleveland Model A ⅞", 1¼", 2"; B 1", 2" ⅞" Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto. #2 Hand

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Power Shears—52", 72" & 96"

Spot & Arc Welders
5, 7, 14, 18 & 30 ton OBI Power Presses
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RADIALS

4' Fosdick 18" col., 8' Carlton, 19" col. M.D.
6' Cincinnati-Bickford
4', 5', 6' American Triple Purpose
Canedy-Otto 3'11" Col. M.D. on Spindle

MILLING MACHINES

Cinn. #3 Pl., #4 Vert. Dial Type, Rect.
#3 K. & T. Dbl. Overarm, motor in base
Cleveland Vert. No. 1 M.D.; #1 Univ.
#2B K & T Univ.; No. 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No. 1, 3 Vert.
B. & S. #12 Elec. Prod. late type, #21

MISCELLANEOUS

Mitts & Merrill, Davis Keyseaters
Wiedman Turret Punch—Type R4P
Buffalo #0 Angle Roll M.D.
Bliss #58-OB Gap Presses, 62, 62A, 162
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
Pexto 6' Power Shears
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Heavy duty Wt. 112,000 lbs.
Automatic DC controls with 3/60/440 motor generator and controls
Like New Spot Delivery

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Capacity 12" diameters
2 Motors Variable Speeds, Q. C.
3/60/220-440 Feed Table
Wt. 8500 lbs. Latest Model

(2) CLEARING POWER PRESSES Model F1200-42
1942 Like New Capacity 200 ton
Bed 38" x 44" F.B., L.R.
Stroke: 1—at 26" 1—at 30"
25 HP 3 phase AC & controls
Wt. 35,000 lbs. All Steel
Spot Delivery

TOGGLES—Bliss Model 1½, 75 ton capacity,
Bliss Model 3¾B 150 ton capacity
Both double action toggles, deep draw

POWER PRESSES

MAKE	TONS	STROKE	DIE SPACE	TYPE
Torrington	50	2" & 1"	23" x 16"	Sub-Arch Press, Dbl Action Cam
Toledo #54	60	3"	18" x 18"	SS with side shear
Bliss #1½ Toggle	75	4" Draw	21" x 20"	Toggle, b.g.
Bethlehem	88	2½"	62" x 58"	SS Double Crank, Single Action
Bliss #5	90	5"	22" x 30"	SS Single Action
Bliss #6	125	5" & 2"	24" x 32"	SS Double or Single Action, b.g.
Bliss #3¾ Toggle	150	10½" Draw	30" x 29"	Toggle, b.g.
Bliss #7	180	5" & 2"	28" x 36"	SS Double or Single Action, any stroke up to 5", b.g.
(2) Clearing (F1200-42)	200	Any stroke up to 30"	36" x 42"	SS, Single Action, b.g.
(2) Bliss #77½	250	12" & 14"	30" x 29"	SS, Single Action, b.g.
(4) Bliss #78½	450	18"	36" x 36"	SS, Single Action, b.g.
Toledo #60¼	1200	23½"	59" x 50"	SS, Single Action, b.g.
Birdsboro Hyd	1300	21"	87" x 29"	SS, Hydraulic

ROLLS, Bending—20' x 1" cap.
Initial type—Drop End
Top & Bottom front roll diams. 24"
Rear bottom roll diam. 18"
2 Motors—50 HP with gear reducer
10 HP raise & lower
Motors to match requirements
Weight—60 ton

BRAKES—New Lynn 56" x 14 Ga.
D&K 8' x 16 G, apron
D&K 4' x 16 G, hand
New Columbia 10' x 3/16"

WARNER & SWASEY UNIV. TURRET LATHE
#4 Preselector geared head 1942
Bar Feed, 30 collets, 2 die heads,
Box tool, numerous turret tools

PELS #24 IRONWORKER
Triple Combination Punch, Shear, Coper
Punch: 1 3/16" thru 1"
Shear: Rds. 2½", Sqs. 2—/18", Angles 6x6x¾"
Motor 15 HP 3/60/220 controls
Wt. 21,000 lbs.

SHEARS—Pexto 5' x 16 G
Geo Ohl 8' x 12 G
Morton 10' x 1½
Col. 10' x 3/16"

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#560-F GIDDINGS & LEWIS, Floor Type, M.D.
#44 UNIVERSAL Tri-Way, Table Type.

GRINDERS

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#2 REID Surface, M.D.
#10 B&S Tool & Cutter, M.D.
#72A3 HEALD Plain & Sizematic, M.D.
#4T SELLERS Tool Grinder, M.D.
9" P&W Hyd. Gear Grinder, M.D.
#11 BLANCHARD Rotary, 16" chuck
4—#4H LANDIS 4"x18" Plain Grinders, M.D. with hyd. straight infeed, hyd. timer & hyd. footstock.
6"x30" NORTON Type "G" Plain Cyl.
24"x96" NORTON Plain, M.D.

LATHES

AMES Precision Bench Lathe, 1" collet cap., M.D.
12" & 14"x30" LODGE & SHIPLEY G.H. Lathe, M.D.
14"x30" LEBLOND HVY DUTY, M.D.
16"x54" LEBLOND HVY DUTY, M.D.
16"x6' SEBASTIAN Lathe, M.D.
50"x17" centers LEBLOND "BIG SWING" Lathe, M.D.

MILLING MACHINES

#5/60 CINCINNATI, Duplex Hydromatic Milling Machine, tracer control mechanism for automatic rise & fall of spindle carriers, M.D. machine used six months.
#12-24 K&T Simplex, M.D.
#1G & 2G KEMPSMITH All Geared Univ., M.D.
#12 VAN NORMAN Universal Miller, M.D.
#2H K&T Vertical, Power Feed, M.D. (3)
#2MS CINCINNATI Dial Type, Plain, M.D.
#4MS CINCINNATI Dial Type, Plain, M.D. (2)
#2HS CINCINNATI Dial Type, Vert., M.D.
#4K K&T Vertical
#12 B&S Prod. Mills, M.D.
#M-50A TAYLOR & FENN Vert., M.D.
#12M MOREY 2-spdle PROFILER, M.D.
#12B P&W 2-spdle PROFILER

TURRET LATHES

#0 B&S Wire Feed Screw Machine, M.D.
#2G MOREY Ram Type, M.D.
Nos. 3, 4, & 5 W&S Ram Type Univ., M.D.
Nos. 3 & 5 J&L Ram Type Univ., M.D.
#4A W&S Saddle Type Univ., M.D.

DRILLS

6-spdle ALLEN Drill, M.D.
3'9" CINCINNATI BICKFORD "Super Service" Radials (3)

MISCELLANEOUS

#36H GOULD & EBERHARDT Gear Hobber.
Used Bases for 4' & 6' CINCINNATI BICKFORD Radials
#4—48" B&S Gear Cutter
40"x32"x51" OHIO Tilting & Revolving Rotary Table for Horizontal Boring Mill
14" Steptoe Shaper, V-belt, M.D.
V-16 DOALL Contour Saw, M.D.

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Screw Machine

5—Hendey 12"x30" Centers Type CR, 18 Speed, geared head, Toolroom Lathes, T.A., M.D., Std. Equip. including draw bar, collets, extra chucks, face plates, 3 HP 220/440, Mfrd. 1942, each $2950.

1—Monarch 12"x30" centers Type CK, 16 Speed, geared head, Toolroom Lathe, T.A., M.D., Std. Equip., extra face plates, chuck 5 HP 220/440, Mfrd. 1942. $3300.

1—Brown & Sharpe 00G Automatic Screw Machine, High Speed, vert. slide, Screw slotting attachment. Serial 17109. 2 HP 220/440, Mfrd. 1942. $3200.

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Resistance Spot Welder, Thomson Gibb 40 KVA
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ENGINEERED REBUILT MACHINE TOOLS

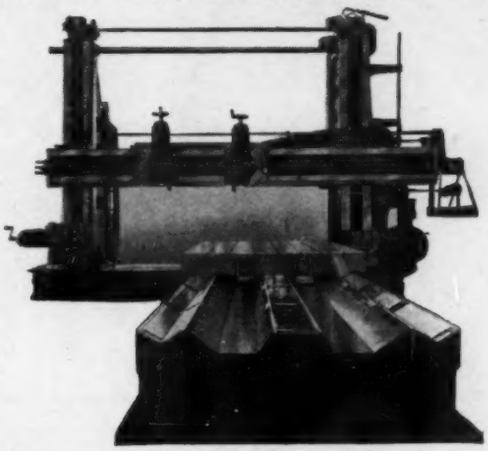
FOR PLANERS . . . SEE SIMMONS

OPENSIDE

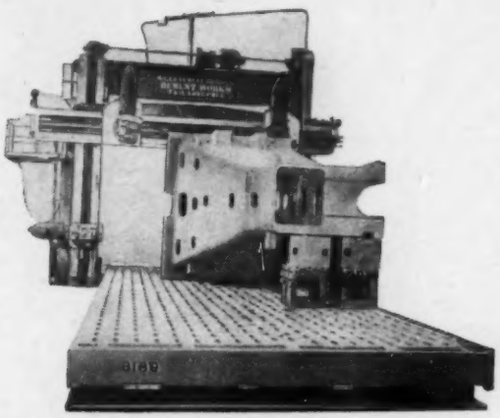
8'6"/15'9"—6"x35' Detrick & Harvey Convertible Openside, double deck, 3 ways, 100 HP, DC
60"x60"x16' Cleveland Openside, 2 heads, AC or DC self-enclosed drive
48"x42"x12' Detrick & Harvey Openside, 2 heads, AC or DC self-contained drive

DOUBLE HOUSING

16'x12'—9"x35' N-B-P Heavy, Variable Voltage Drive, 4 heads, 125 HP AC
10'x10'x20' N-B-P Heavy, 4 heads, forced feed lubrication, 50 HP DC
72"x72"x18' N-B-P Heavy, 4 heads, P.R.T. 230 V. DC
60"x60"x20' N-B-P Heavy, 4 heads, 230 V DC
48"x48"x32' G.A. Gray Spiral Geared, 4 heads, 230 V DC
48"x48"x24' N-B-P, 3 heads, 230 V DC
48"x48"x18' Detrick & Harvey Heavy, 4 heads, 230 V DC
42"x42"x12' N-B-P, 4 heads, 230 V DC
36"x36"x14' G.A. Gray, 3 speed, 4 heads, self-contained M.D. AC or DC
36"x36"x8' Cincinnati Heavy, 3 heads, 230 V DC
30"x30"x10' Cincinnati, 2 heads, self contained M.D. AC or DC
No. 3 Hilles & Jones 30"x1¼" Plate Planer, ten pneumatic jacks, AC or DC



8' 0"/15'x9'-6"x35' Detrick & Harvey Convertible Openside, 4 heads, 3 ways, 100 HP, 230 Volt DC Planer motor and control station



16'x12' 9"x35' N-B-P Variable Voltage Drive, 4 heads, 75 HP main drive motor with 75 KW motor generator set driven by 125 HP, 220/440 V. AC motor and controls

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Fellows 36" Gear Shaper (2) in stock, each $500

Heald #70A Internal Grinder, late model, motor driven. $1500

Barber-Coleman #3 Gear Hobber, arranged for motor drive. $450

Brown & Sharpe #5B Heavy Plain Miller, single pulley drive, table 21 x 78". $1950

Kent-Owens #2-20 Production Miller, table 12 x 42, late model. Motor driven. $750

REYNOLDS

MACHINERY CO.

303 EDDY STREET

PROVIDENCE 3, R. I.

GAspee 5187

LATE TYPE TOOLS

36" Bullard Spiral Drive, 1943 tool
No. 2MH Cinci. Univ. Miller, 1944
No. 2H K. & T. Univ. Miller, 1944, slotting & vert. attach. & rotary table.
Nos. 2, 3, 4, & 5 W. & S. Univ. Turrets, late
22"x96" centers Monarch, new 1944
36"x23' centers, 42"x17' centers, 48"x16' centers, & 60"x15' centers Niles Lathes, all new 1942
28/50"x14' Rahn-Larmon Gap Lathe, T. A.
No. 48H Gould & Eberhardt Gear Hobbers, 1941
12" Gleason Gear Generators, 1943 (3)
6' Fosdick Radial, 19" col., 1943.

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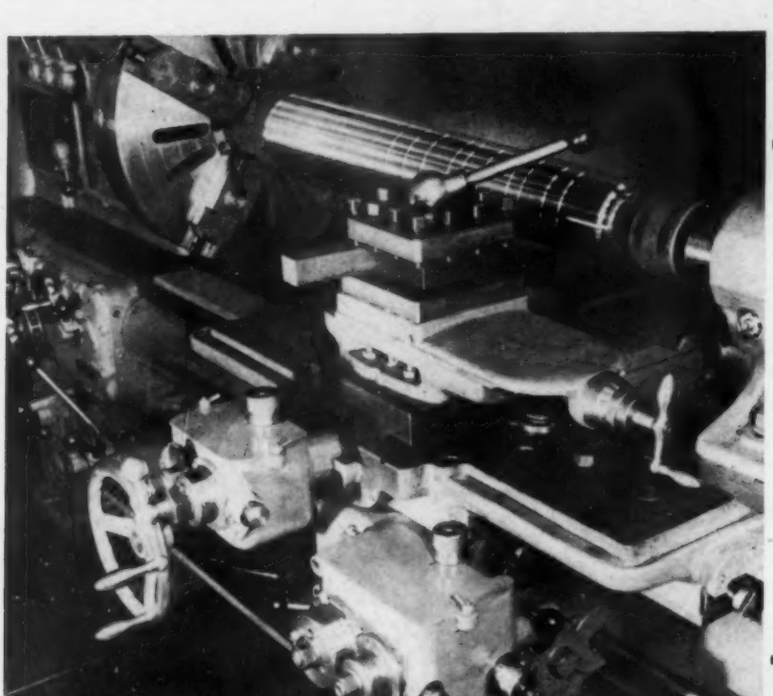

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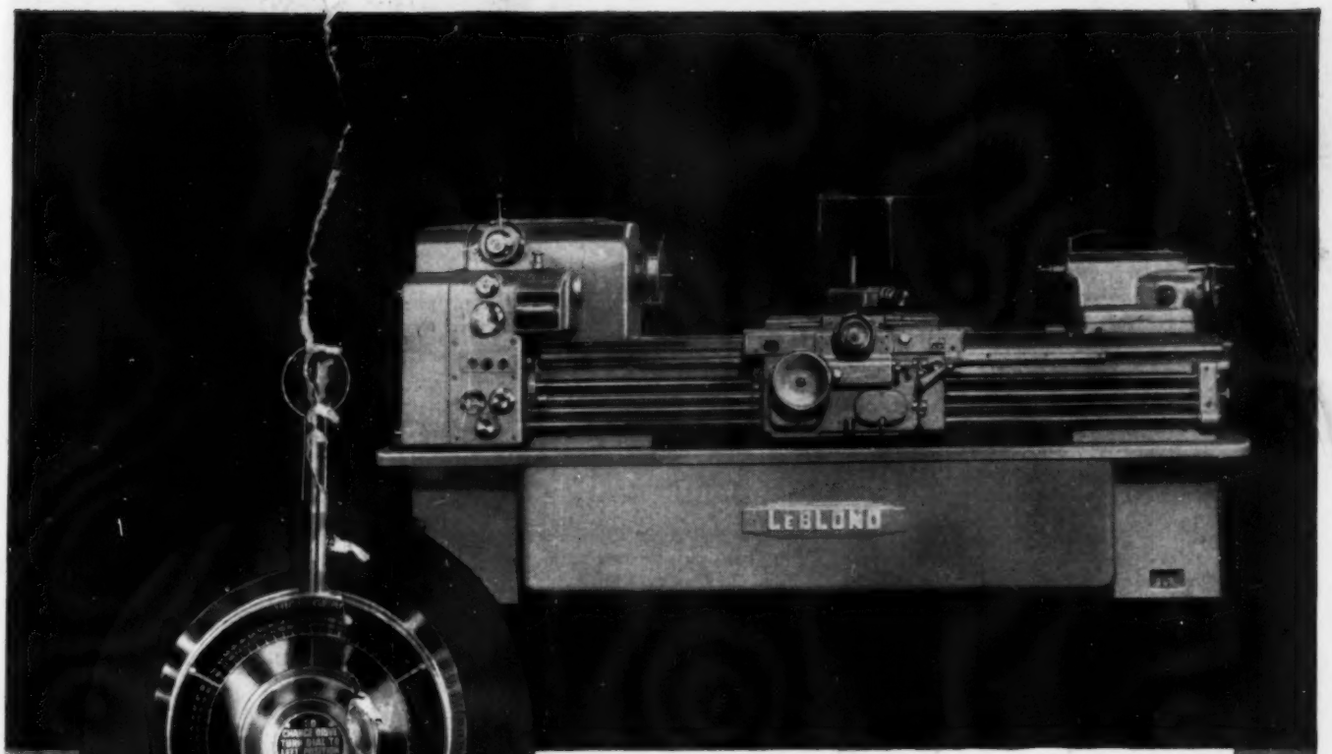

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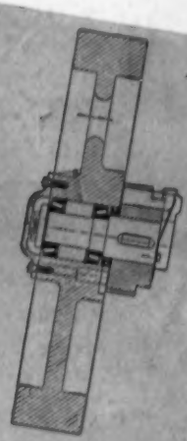

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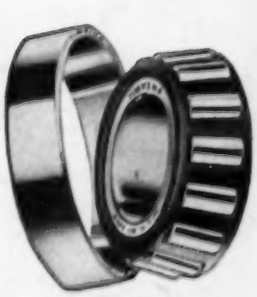

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